Coal Age

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JULY, 1956

A McGRAW-HILL PUBLICATION — PRICE 50c





high-pressure and high-temperature molding for extra

LAMINATED PROTECTION

Laminated construction means the M-S-A COMFO CAP protection is built-in, layer by layer. Quality materials, blended to provide maximum strength without excessive weight, are used. This method means exact positioning of the reinforcing pieces for maximum safeguard. But that's only part of the protection story. To make sure these material layers are *permanently welded*, more than 2000 pounds of pressure, and carefully controlled heat, are used in our molding process. The result is a one-piece, smooth, laminated shell that gives miners an extra margin of safety. Streamlined design makes it ideal for low roof conditions. Resists mine water, oil, sweat.

inside

. . . quality design and material selection for

SUSPENSION SAFETY-COMFORT

M-S-A Comfo Cap suspensions are designed to provide maximum protection, better distribution of impact. Crown straps are of high quality material selected for strength, comfort and durability. The entire suspension assemblies are tailored for top comfort. Available in either sized or adjustable suspensions covering full range of head sizes—6½-7¼ inches. Standard Sized Laced type, Adjustable Laced type.

with M-S-A® COMFO CAPS

Small wonder M-S-A Comfo Caps are turning head accidents into incidents in mines everywhere. Tough, rugged, *laminated* shell construction dissipates the force of impact —engineered suspensions cushion the blow, permit non-slipping adjustment that means accurate fit. And comfort qualities encourage full-time hat use. Our bulletin gives complete details. Write for your copy.

COLORS! M-S-A Comfo Caps available in red, white, green, yellow, blue, brown, gray, and black.

MSA

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When you have a safety problem, M-S-A is at your service. Our job is to help you.

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B.F.Goodrich



TVA's Shawnee Steam Plant

How to burn 600 tons of coal in one hour

A typical example of B. F. Goodrich improvement in rubber

THIS is one of the nation's biggest power plants. Coal that goes into it could furnish electric power for a city the size of Detroit. There's a network of nearly three miles of B. F. Goodrich conveyor belts running in four different directions. One goes over towers 50 feet high, over a road and a river channel; others tunnel underground. They carry 14,000 tons a day into the plant.

One belt half a mile long, running from the river into the plant, would once have been a terrific problem. But B. F. Goodrich had made these big systems practical by developing the cord belt. Cords running lengthwise, buried in the rubber, add so much strength that a single belt can travel distances once considered impossible. It's flexible too, and stands crashing blows from heavy lumps or sharp edges that would gouge or break many ordinary belts.

All of the other belts have other B. F. Goodrich improvements too, brought by better manufacturing methods—such as making belts under uniform tension, so that all fibers work together; seamless plies to avoid weak spots; cushioned edges for longer wear; patented layers called "breakers" to stand hard blows; mildew treatment to protect fabric. All these improvements and many others help cut costs through better performance.

Call your B. F. Goodrich distributor for more information about any kind of belting—or hose or other B. F. Goodrich rubber products. *B. F. Goodrich Industrial Products Co., Dept. M-698, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

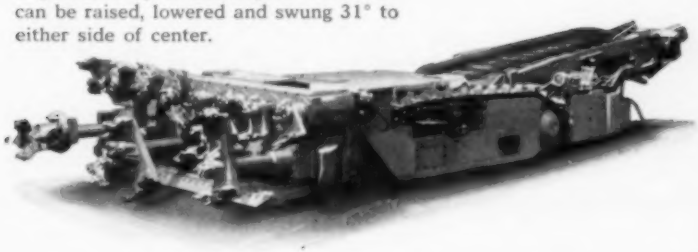
Easy mining not a prerequisite . . .
Record tonnages are being mined
in such seams as No. 5 Indiana
and No. 8 Pittsburgh

JEFFREY



76-AM Colmol operating in 42" coal. Note clean roof, walls and floor. Operator is 20' from the face, working in a protected position.

The 76-AM Colmol has duplicate controls on each side. Additional flexibility is provided by a discharge boom which can be raised, lowered and swung 31° to either side of center.



76 COLMOL®

REMARKABLE PRODUCTION is being credited to the Colmol . . . average tonnages over a period of weeks of 550 per shift and peak tonnages in excess of 750 per shift.

The Colmol requires a minimum of maneuvering, helping to account for this highly efficient performance. It handles easily on its long, wide crawlers . . . can be turned in its own length . . . mines the coal without constant manipulation of controls.

Coal is broken from the face, not ripped or ground off, resulting in favorable overall screen consist.

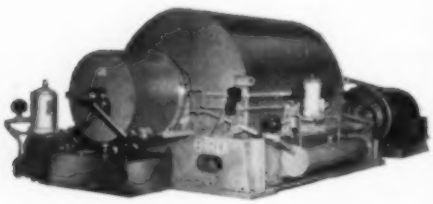
Designed for working in low veins, the 76-AM Colmol continuous mining machine is applicable to seams ranging from 38″ to 54″; the 76-B Colmol for medium-high seams up to 72″.

Jeffrey also makes the MOLVEYOR® for continuous transportation behind continuous mining machines, Loaders, Universal Cutters, Conveyors, Shuttle Cars, Face and Roof Drills, Locomotives, Fans and Blowers. For literature, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

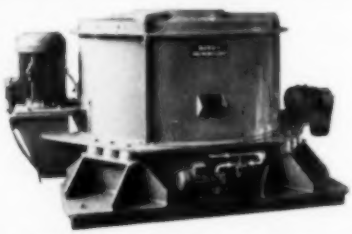
THE ONLY FINE COAL CENTRIFUGAL DRYER BETTER THAN A BIRD



The Bird Continuous Centrifugal Solid Bowl Coal Filter

- Handles feed at any flowable consistency — table discharge makes an ideal feed.

  The only equipment that does the complete job. No supplemental or auxiliary equipment required.
- Big capacity — built in three sizes, the largest to deliver up to a ton or more of $\frac{3}{8}$" by 0 coal per minute.
- High recovery of coal values.
- Controlled rejection of high ash fines when desired.
- Moisture content of delivered coal as low as can be obtained mechanically.
- Lowest over-all cost.



The Bird-Humboldt Continuous Centrifugal Screen Type Coal Dryer

- Continuous operation for months with only routine maintenance.
- Long screen life — in excess of 500 hours, based on actual field experience.
- Exceptionally low power requirements — approximately 0.4 HP per ton.
- Big capacity, 70–80 tons per hour.
- 98% or higher recovery of feed solids.
- Low moisture content — minimum obtainable mechanically.
- Practically no degradation.
- Handles feed from dewatering screens containing as much as 45% water.

ANOTHER BIRD

One of these centrifugals will do the best, most economical job of dewatering fine coal in your plant. To make sure you obtain the right Bird, check the features listed above then ask us to furnish you with complete facts and figures.

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Coal Age

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In this issue . . .

• First U. S. production model of a wheel excavator extends the stripping range of a 33-yd shovel at Truax-Traer's Fiatt, Ill., operation. The article beginning on p 60 tells how the excavator is used and lists its design features. In one pass the wheel spoils overburden 350 ft from the point of pick-up, leaving spoil room closer for the shovel.

• On p 56 guest author J. A. Hagy tracks the origin of the dust problem in mines and warns of the effects on men of harmful concentrations. But author Hagy, in a thorough job of reporting, goes on to the answers of allaying dust now used and tells what is needed for future progress. In one of his conclusions he calls for a better system of determining what the concentrations are.

• Closely-controlled two-bench stripping, effective preparation at a modern plant and the newest equipment for fluidized-bed drying of fine coal are prime factors in creating high efficiency at operations of the Lynnville Coal Co. Its tale of efficiency begins on p 76.

On our cover

Everyone connected with the coal industry knows its name, now—The Mountaineer. In case you've forgotten its chief vital statistic is a 60-yd bucket. Other statistics: a 50-sec cycle; a 160-ft height; and a capability of handling up to 110 ft of cover. Today, the Mountaineer is removing overburden 94 ft thick to expose the 4½-ft Pittsburgh seam at Hanna Coal's Georgetown No. 12 mine near Cadiz, Ohio.

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The Texas Company, 135 East 42nd Street, New York 17, New York.

Photo courtesy Goodman Mfg. Co.



LUBRICANTS for the Coal Mining Industry

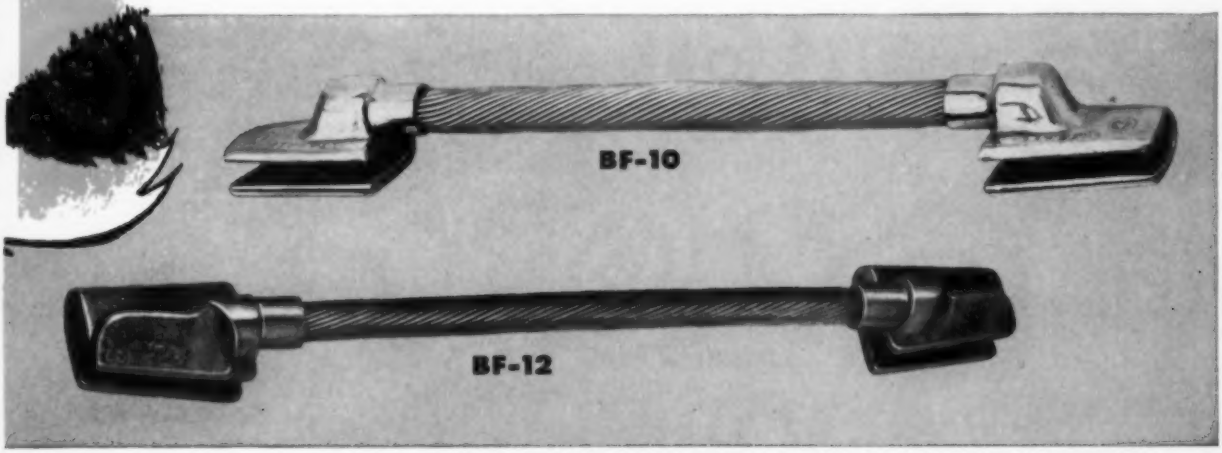


YOU TAKES YOUR CHOICE WITH TIGERWELD!

A good rail bond for every purpose

Take the Tigerweld BF-10 and Tigerweld BF-12 Rail Bonds, for example. Both are extremely rugged, extremely reliable. Both are easy to install. Both have heavy steel self-clamping terminals that hold themselves on the rail while you weld. Both are fastened with a strong steel-to-steel weld. Both have the strand permanently butt-welded to the terminals. The one important difference: the BF-12 has a raised shoulder that allows you to lay on more weld metal and get a stronger joint.

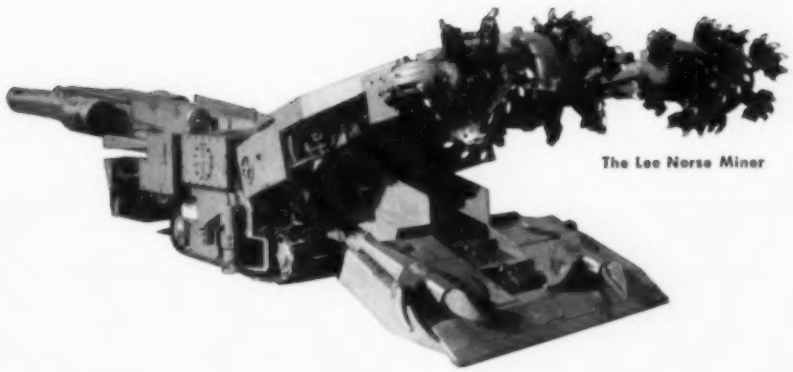
And this one difference is enough to make some customers prefer the BF-12, while others prefer the BF-10. So we make both, and everybody's happy. Everyone gets just the type of bond he wants. You will find Tigerweld Bonds for bootlegs. Tigerweld Bonds for splice bars. Tigerweld Bonds for cross-bonding. Tigerweld Bonds for temporary trackage. Tigerweld Bonds for permanent trackage. Write, or call the nearest sales office of American Steel & Wire to fill *any* bonding requirement.



USS **TIGERWELD** **RAIL BONDS**

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UNITED STATES STEEL



The Lee Norse Miner

70 tons of material per man at the face

Westinghouse SK motors stand up under tremendous loads and torque at Weirton coal

Mining operations, such as this cutting through tough Pittsburgh draw-slate, call for the rugged, dependable power that has made Westinghouse SK motors the first choice of the mining industry.

To get day-in, day-out production at Weirton and other mines, the Lee Norse Miner shown here needs *compact* power. Westinghouse answered this need by designing a special water-cooled, explosion-proof motor for more horsepower in a smaller space.

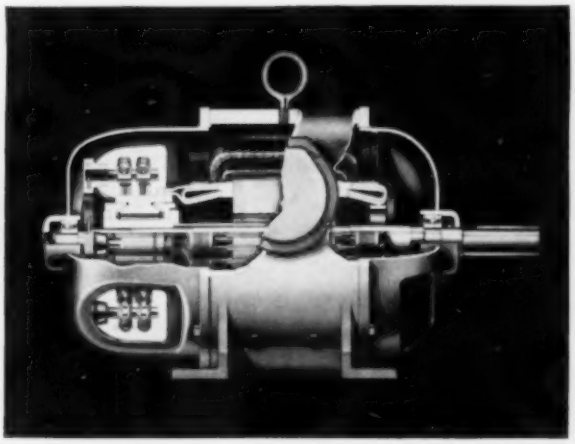
Get all the facts about Westinghouse SK motors, both standard and special, by calling your Westinghouse sales engineer today. J-21934

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***



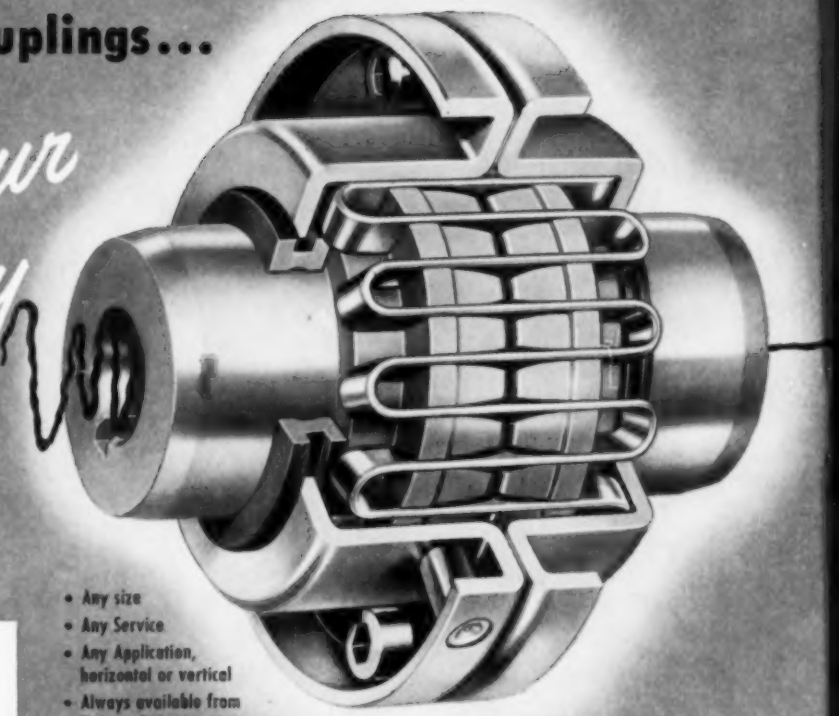
The muscles of this Lee Norse Miner are three 40-hp, water-cooled, explosion-proof SK motors and two 10-hp, explosion-proof SK motors. All the cutting is powered by only two of the 40-hp units.



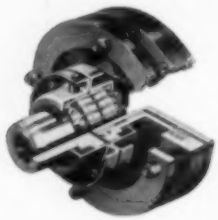
Westinghouse builds a complete line of SK motors for the mining industry. The dependability of SK motors comes from (1) 600-volt insulation, (2) large commutator bars, (3) heavy-duty cast brass brushholders, (4) 4-way, sealed-for-life bearings.

Falk Steelflex Couplings...

Protect your machinery in 2 ways



- Any size
- Any Service
- Any Application, horizontal or vertical
- Always available from factory, field or distributor stocks

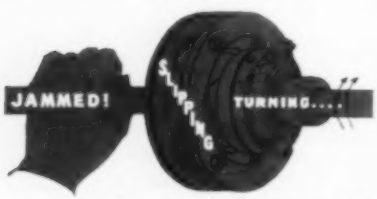


Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, its *torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance ... are easy to install, lubricate and disconnect ... and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

FALK

...a good name in industry

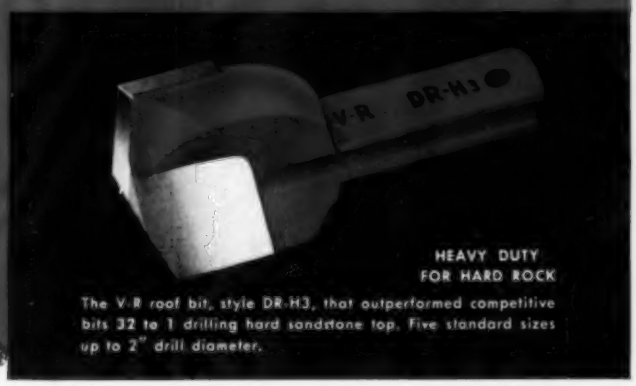
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- Steel Castings
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"This V-R ROOF BIT

Drilled 32 Holes in Hard Sandstone Where Another Bit Failed After One Hole"



HEAVY DUTY FOR HARD ROCK

The V-R roof bit, style DR-H3, that outperformed competitive bits 32 to 1 drilling hard sandstone top. Five standard sizes up to 2" drill diameter.

■ *". . . we have some of the hardest sandstone top you will ever want. We were using —— bits and on a 30" hole getting only one place to a bit. This particular sandstone is bad enough to slab out and has to be pinned or timbered. The seam averages 48" in height.*

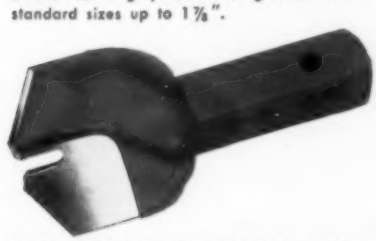
"With a V-R style DR-H3 bit we are getting as much as 32 holes before being ready for a grind. On one test, only the finishing bit needed a grind after the 32 holes. The starting bit was still going strong. We got 60 ft. 10 inches out of that finishing bit, something we'd never gotten from a bit before.

"You have to use a V-R Roof Bit before you can realize that the make of bit can make so much difference in roof drilling time and cost."

It's the carbide in a roof bit that does the work! Vascoloy-Ramet Corporation manufactures superior grades of carbide specially for roof bit application. For faster, lower cost roof drilling, use V-R bits, get the facts . . .



STANDARD BITS—Style DR-H1 for shock loads and ordinary rock drilling, Style DR-H2 for highly abrasive ground. Six standard sizes up to 1⅞".



FOR FAST DRILLING IN SOFT ROCK—Style DR5. Three standard sizes up to 1⅝".

All V-R Roof Bits available in non-standard sizes to meet requirements.



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M-585

MANUFACTURERS OF CEMENTED CARBIDES • CUTTER BITS • FINGER BITS • AUGER BITS • ROTARY BITS • ROOF BITS • PERCUSSION BITS • CARBIDE INSERTS

Excellent fragmentation in stripping with high-strength, low-cost Du Pont NITRAMITE®

ALABAMA MINE ACHIEVES MAXIMUM SAFETY WITH NEW MEDIUM-DENSITY BLASTING AGENT



BANK about to be shot at the Marigold Coal Company of Jasper, Alabama. Thirty-foot overburden is half sandstone, half blue shale.





LOADER (left) lowers easily handled container of "Nitramite" (8" x 48 lbs.) into 30-ft. holes drilled to a 20' x 20' pattern. At right: loading special non-nitroglycerine primer (7" x 10 lbs.), which detonates "Nitramite" and is initiated with "Primacord."





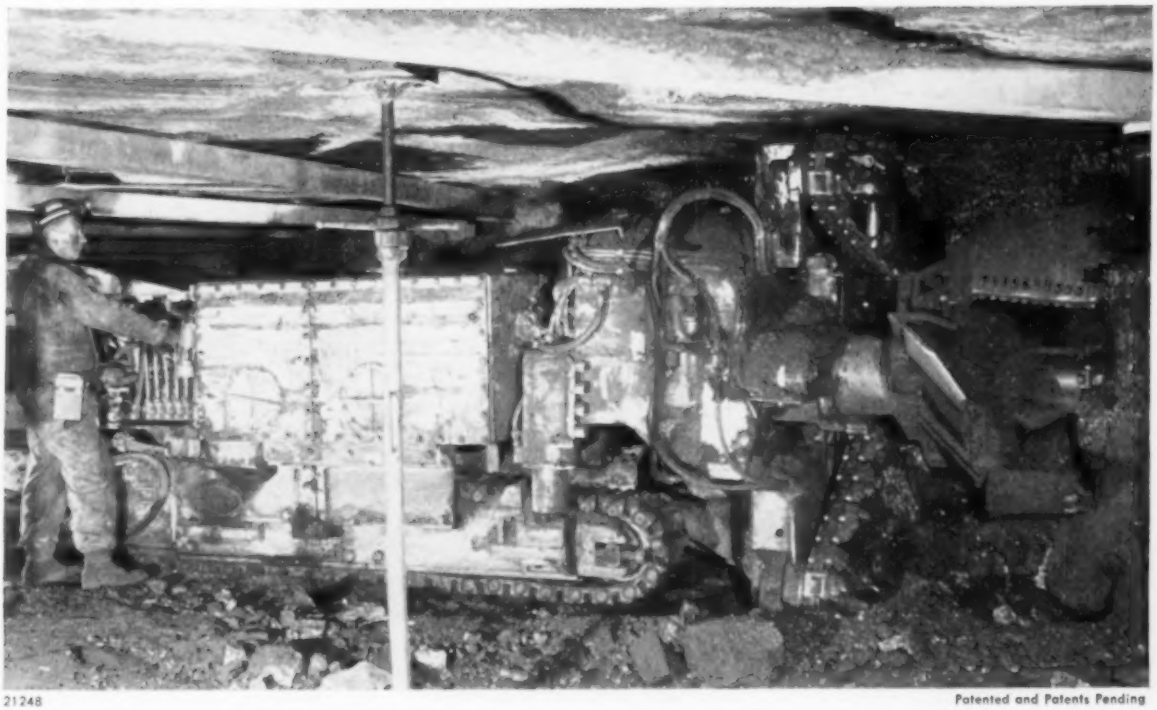
TYPICAL RESULT of "Nitramite" blast is well-broken overburden (left), which is easily and quickly scooped up by 10-yard shovel (right). "Nitramite" provides the same combination of efficiency and economy in both hard and soft overburdens.

Safer blasting is another result of using "Nitramite" in strippings. Friction, shock, ordinary blasting caps—even the impact of rifle bullets—won't cause explosion. "Nitramite" containers are water-resistant . . . can be loaded up to eight hours before shooting. For further information, talk to your Du Pont representative, or write E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

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BLASTING AGENTS
Products of Du Pont Explosives Research

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REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



21248

Patented and Patents Pending

TOP PERFORMANCE *any way you look at it with a* GOODMAN CONTINUOUS BORER

High Tonnage —cuts and loads up to 8 tons per minute. Good size consist as coal is cut with bits contacting only small area of face. Dust during operation is kept to a minimum, readily spray-controlled.

Easy Maneuverability —works equally as well in pillar recovery, entries and rooms. It follows seam irregularities by vertical or sideways tilt of cutting element; retracts cutting elements for safe tramming clearances at top, bottom and sides. Has full hydraulic control of all movements for ease of handling.

Arched sides and narrow span of flat roof are left by Goodman Borer. Bottom is wide and flat for good roadway. 21243



Low Costs —high capacity promotes true concentrated working areas requiring fewer man hours, less supervision and less capital investment.

Maximum Safety —eliminates hazards associated with drilling and blasting; cuts arched path for natural roof support; advances rapidly so rooms are kept open but a short time thus reducing possibilities of roof deterioration.

Minimum Maintenance —clean, simple design featuring large parts and a minimum of moving parts.

When you put Goodman Continuous Borers in your mine you immediately control your two most important factors, costs and production. And you get extra productivity at no extra cost as the borer spends more time at the face.

GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts





HEADED BOLT USED WITH EXPANSION SHELL PROMOTES MINE SAFETY

Your mine becomes safer, protected from the danger of severe roof falls, when you adopt a roof-bolting program, using Bethlehem's square-head roof bolt with Type C expansion shell.

The Bethlehem square-head roof-bolt assembly promotes safety in the mine by anchoring overlying rock so that it becomes a single-unit thick beam. Installations of this type also facilitate mining and increase production, as mechanized equipment can be operated right up to the face. There's less need for storage space, too, both in the mine and topside. Besides, ventilation is improved, due to the lack of bulky supports.

The Bethlehem square-head roof bolt comes in three types: a ¾-in. carbon-steel bolt, and a ⅝-in. high-strength bolt, each with a typical breaking load of 24,000 lb, and a ⅞-in. high-strength bolt, with a typical breaking load of 45,000 lb.

Which type of roof bolt is the most suitable naturally depends on the rock conditions in the individual mine. If you would like to talk about roof bolting and the best type to use in your own mine, a Bethlehem representative will be glad to call at your convenience.



Slotted Bolt Ideal for Special Locations

Bethlehem also makes a 1-in. slotted roof bolt. The slotted bolt is used with a wedge, which is started in the 6-in.-long forged slot before the bolt is placed in the hole. Then the bolt is driven to refusal, forcing the wedge deep into the slot, spreading the bolt-ends and anchoring the bolt securely.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

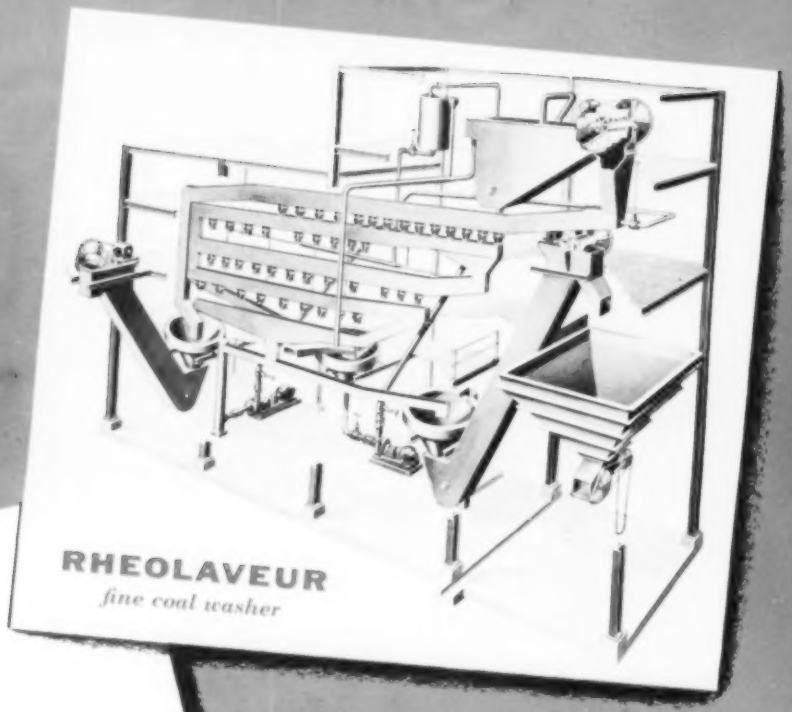
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

ENGINEERED AND READY TO ADD EXTRA PROFITS

TO YOUR PRESENT PREPARATION PLANT



RHEOLAVEUR
fine coal washer



DRYCLONE
fine coal dryer

Fines that used to be bypassed and lost are easily collected for extra premium profits.

McNally Pittsburg's Rheolaveur Systems are saving thousands of tons of marketable coal in the washing process. The McNally Pittsburg Dryclone dries fine coals to minimum moisture content. These packaged units may be added quickly to your present installation. Low cost—low maintenance—automatic! Send post card for information.

Ask
the men who know coal from the ground up

McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

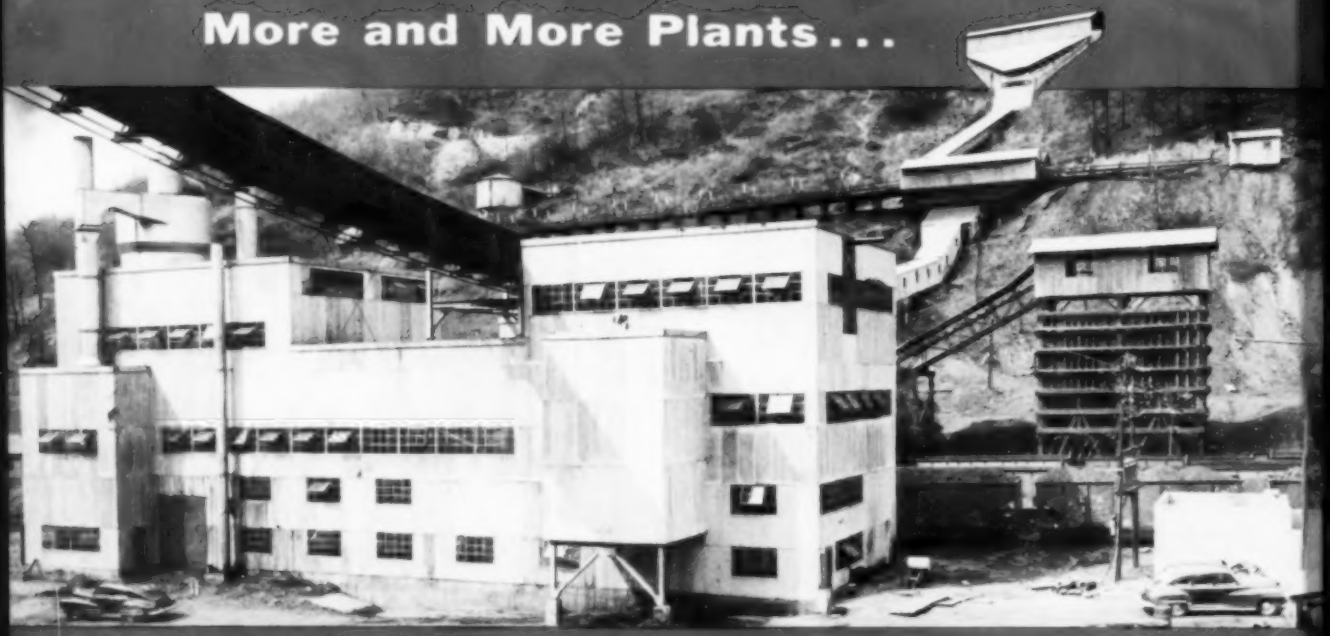
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McNally Pittsburg Mfg. Corp.
PITTSBURG, KANSAS

More and More Plants...



Black Star Mine, Alva, Kentucky

...depend on McNally Pittsburg engineering and equipment to meet today's competition



Eastern Coal Corp., Stone, Kentucky

Gentlemen:

Please send information on the McNally Pittsburg Rheolaveur Washer and the Dryclone.

We need to wash_____" x 0 at_____tons per hour and dry_____" x 0 at_____tons per hour.

Name_____ Title_____

Company_____

City and State_____

C

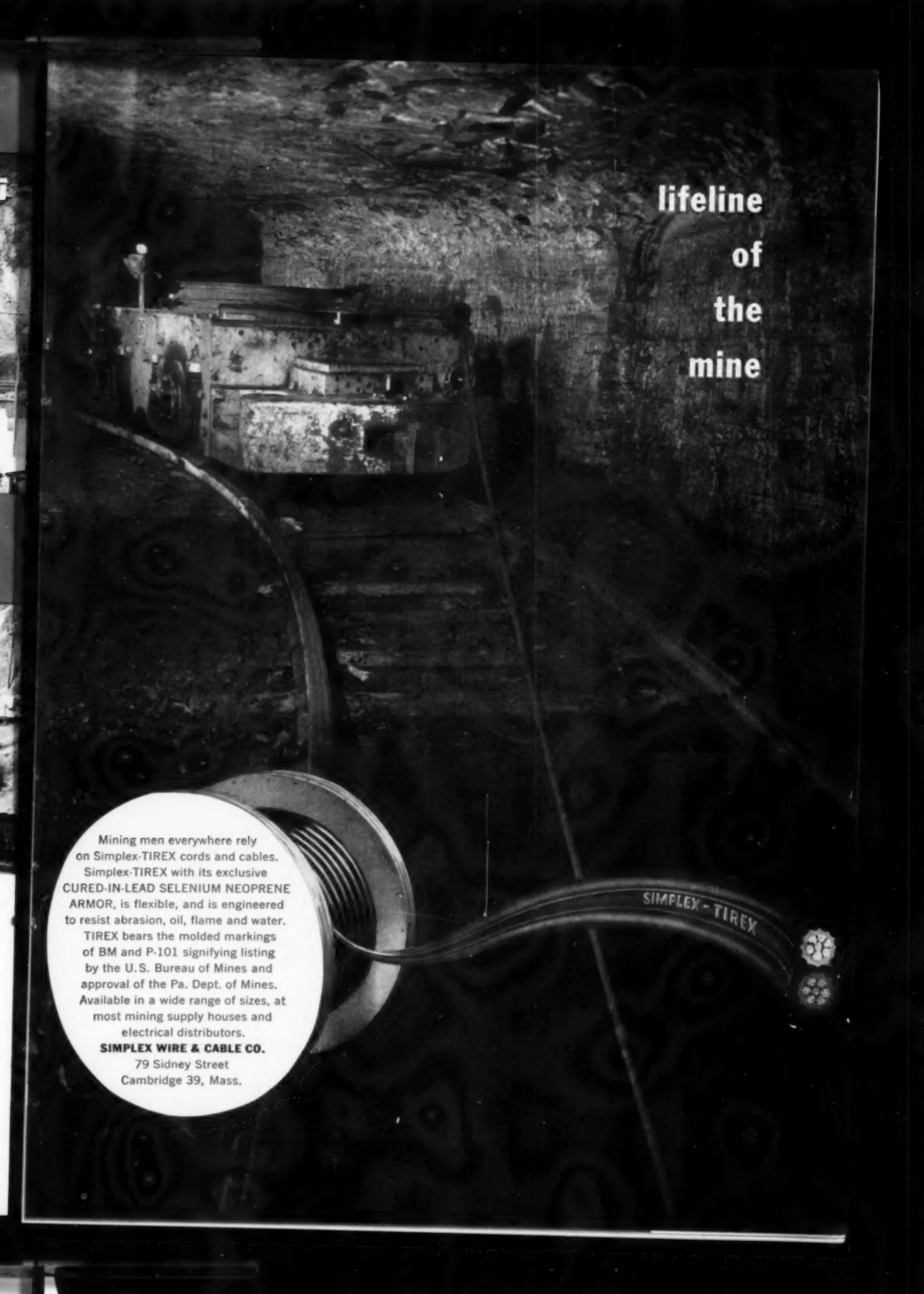
Black Star and Eastern are among the hundreds of leading mines meeting today's competition—with complete McNally Pittsburg plants—or with special McNally Pittsburg additions.

Let the Men Who Know help you make bigger profits from your present plant. Send post card.

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio



Mining men everywhere rely on Simplex-TIREX cords and cables. Simplex-TIREX with its exclusive CURED-IN-LEAD SELENIUM NEOPRENE ARMOR, is flexible, and is engineered to resist abrasion, oil, flame and water. TIREX bears the molded markings of BM and P-101 signifying listing by the U.S. Bureau of Mines and approval of the Pa. Dept. of Mines. Available in a wide range of sizes, at most mining supply houses and electrical distributors.

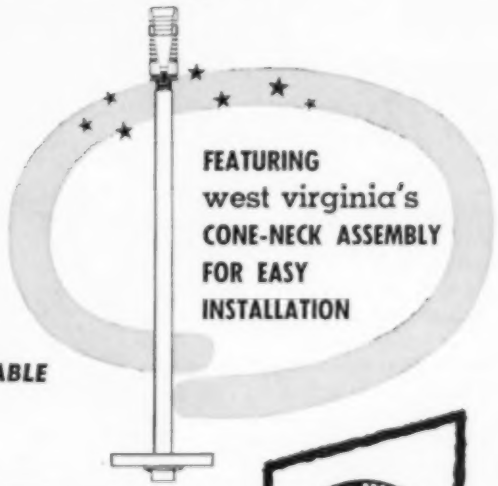
SIMPLEX WIRE & CABLE CO.
79 Sidney Street
Cambridge 39, Mass.

DEPENDABLE ROOF BOLTS are "ENGINEERED" at West Virginia!



Quality roof bolts don't just happen

This huge West Virginia hydraulic testing machine subjects your roof bolts to punishing stress . . . much more than they would receive in actual usage. To achieve absolute safety, Charlie White of our technical staff tests these bolts to insure their ultimate strength exceeds 80,000 lbs. per square inch. This is one of the many reasons America's best mines buy West Virginia bolts with confidence.



STYLE R AND WEDGEGRIP UNITS AVAILABLE FOR ALL ROOF CONDITIONS

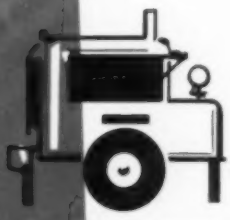
west virginia steel and mfg. co.

BOX 316 **HUNTINGTON, WEST VIRGINIA**

Got a tough job?

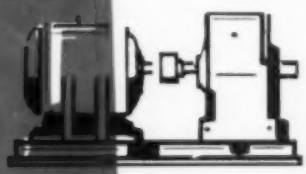
Give it to STANOIL Industrial Oil

This oil gives superior lubrication to a long list of mine equipment—here are three big jobs it can do—



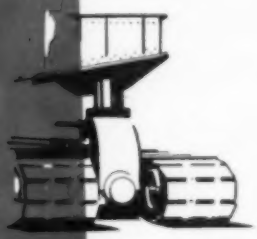
COMPRESSOR

High oxidation stability and low carbon-forming characteristics of STANOIL virtually eliminate the danger of carbon deposits on valves. STANOIL separates readily from water. There is no problem of emulsion in compressor crankcase.



SPEED REDUCER

There are many years between maintenance jobs on speed reducers when STANOIL is the lubricant. Herringbone gears remain clean and free of wear. Low pour point of STANOIL gives oil ability to flow freely from a cold start. No trouble either in prolonged, high temperature operation.



HYDRAULIC JACKS

Tough mine hydraulic service is the ideal place for STANOIL. High viscosity index and low pour point of STANOIL assure smooth operation no matter what the temperature. STANOIL resists contamination, will not emulsify.

Pick your tough lubrication jobs, give them to STANOIL Industrial Oil and get the results you have wanted. Find out more. Call your Standard Oil industrial lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. He is experienced in mine lubrication. Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

Quick Facts About

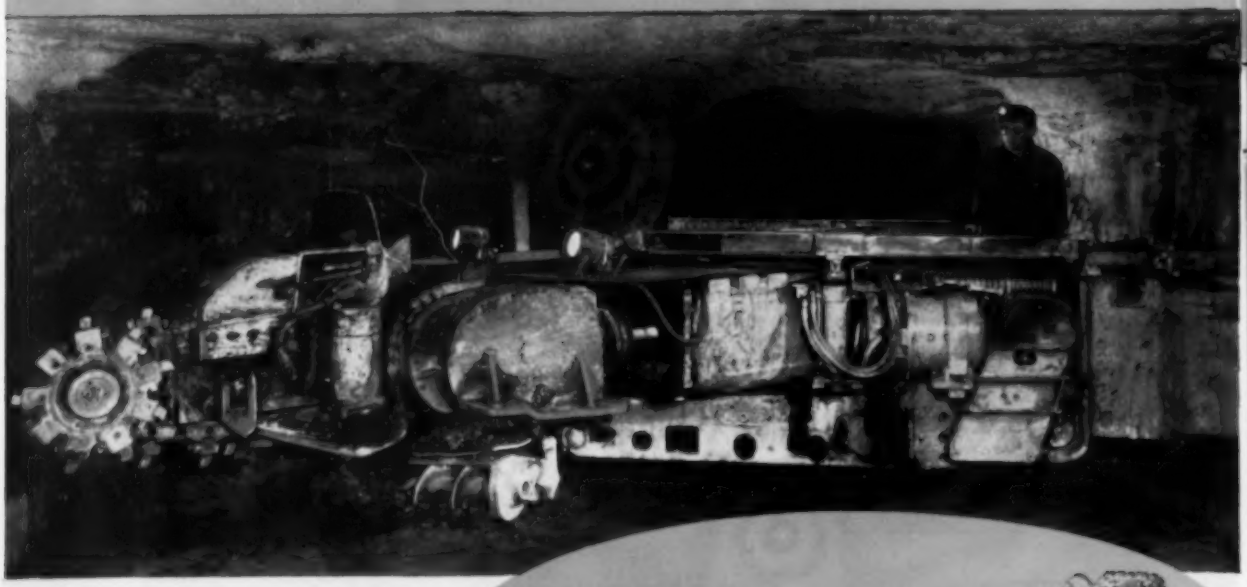
STANOIL Industrial Oil

- **Stability**—STANOIL's antioxidant gives oil resistance to chemical change, minimizes deposits.
- **Rust Prevention**—Inhibitor in STANOIL "plates out" on metal surfaces, prevents corrosion.
- **Cold Starts**—STANOIL has low pour point. Flows freely from cold start. No need for costly warm-ups.
- **Resists Effects of Temperature Change**—STANOIL has high viscosity index, is resistant to temperature change.
- **Has Excellent Demulsibility**—STANOIL is refined to eliminate emulsion problems, contains additive to minimize foaming.

STANDARD OIL COMPANY
(Indiana)

STANDARD

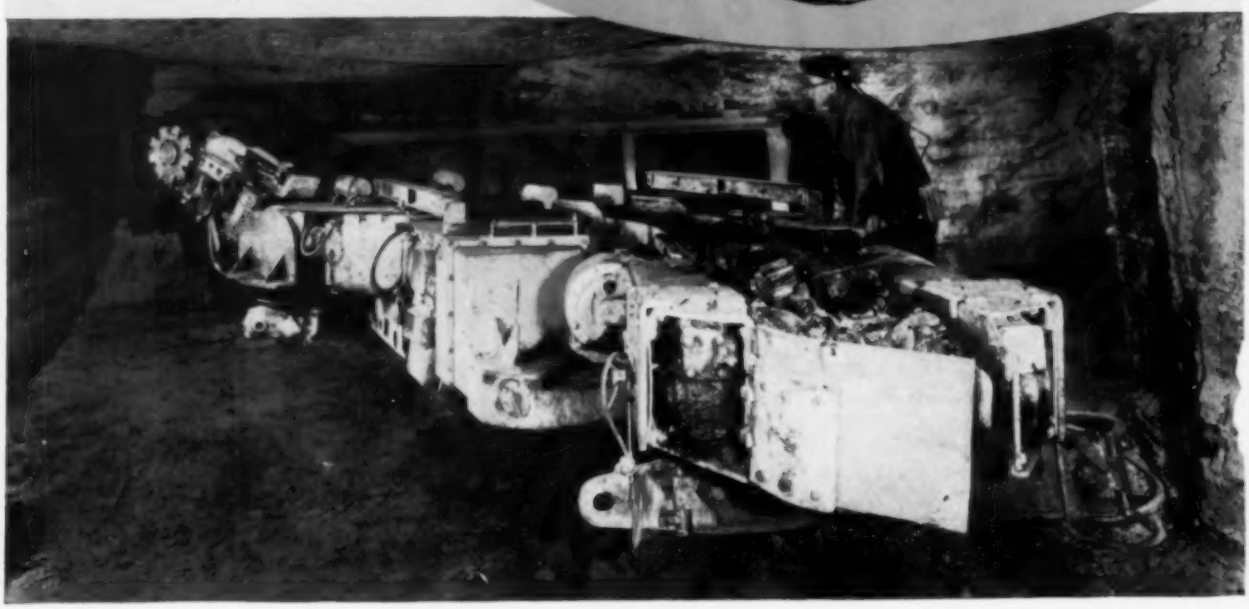
Another step forward in Continuous Mining...



In the 3 JCM-4, positive positioning of ripper bar is provided by hydraulic shear jacks, coupled through the chain for quick response. Operating controls are safely located just behind timber jacks at right rear of machine, so operator always works under timbered roof.



All piping and wiring is junctioned to provide swing clearance and easy accessibility.



HUSKIER SIMPLER MORE POWERFUL

MORE RELIABLE LESS MAINTENANCE

that's the story of the latest model

3 JCM-4 CONTINUOUS MINER

Joy research and field engineering has done it again! The 3 JCM Continuous Miner, a highly successful unit that's field-proved in mines all over the world, is now available in an improved "Mark 4" model—heavier, more rugged and foolproof, better able than ever to stay on the job and show you new cost savings and production records.

The 3 JCM-4 features a multiple-chain head with bit rings ("pineapples") on each side that cut a clearance path and relieve the load on the outside chains. Permits the use of heavier, stronger, longer-wearing chain, and an increased width of head from 30″ to 38¾″. The wider head reduces shearing time—*each cut is now 30% wider, 39″ instead of 30″.*

Ripper bar gear cases are heavier, and have bevel instead of worm gears—in fact, no worm gears are used for cutting or movement of material. These individual bevel gear drives for ripper head, front and rear conveyor reduce the friction loss of former drives and provide more actual drive power. A 5-foot ripper bar, now standard, offers more chain pitches, smoother cutting and less fly-coal than the former 4-foot bar (5½-foot bar also available). Both the front and rear conveyor drives, and the conveyor flights, have been engineered for greater strength, accessibility and reliability, and longer life.

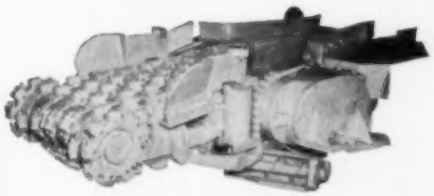
These and other features put the 3 JCM-4 away out in front in its class. The unit is 34″ high for medium seams of 40″ and higher; has 2-3 tons-a-minute capacity, depending on seam conditions; cuts vertical paths 39″ wide and 18″ deep, from 10¾″ below to 74″ above floor (93″ above with 5½″ bar); drives entries, mines rooms and extracts pillars; operates in rooms from 11′-10″ to 18′-6″ wide; turns 12-ft. crosscut 90° from 12-ft. room on a 5-ft. radius; trams 39 feet a minute; successful in coal and, with modifications, equally successful in potash, bauxite, borax and similar materials.

● Let us show you the advantages of the 3 JCM-4 and other complete Joy systems in continuous mining. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 112-1

WSW 6106-112

CONVERSION UNITS AVAILABLE
for older model 3-JCM Machines



With a conversion unit, supplied as a complete factory-built assembly, earlier 3 JCM models can be improved and their capacity increased. Installed simply by removing the old unit, sliding in the new, and making the necessary connections.

A complete conversion unit consists of a new G6111 5-chain assembly with bit rings and sideboards, mechanically driven clean-up, bevel gears for both the heavy-duty ripper bar gear cases and the front conveyor drive, redesigned shear jacks and linkage, all assembled on the new sumping frame. • Check with your nearest Joy district office.



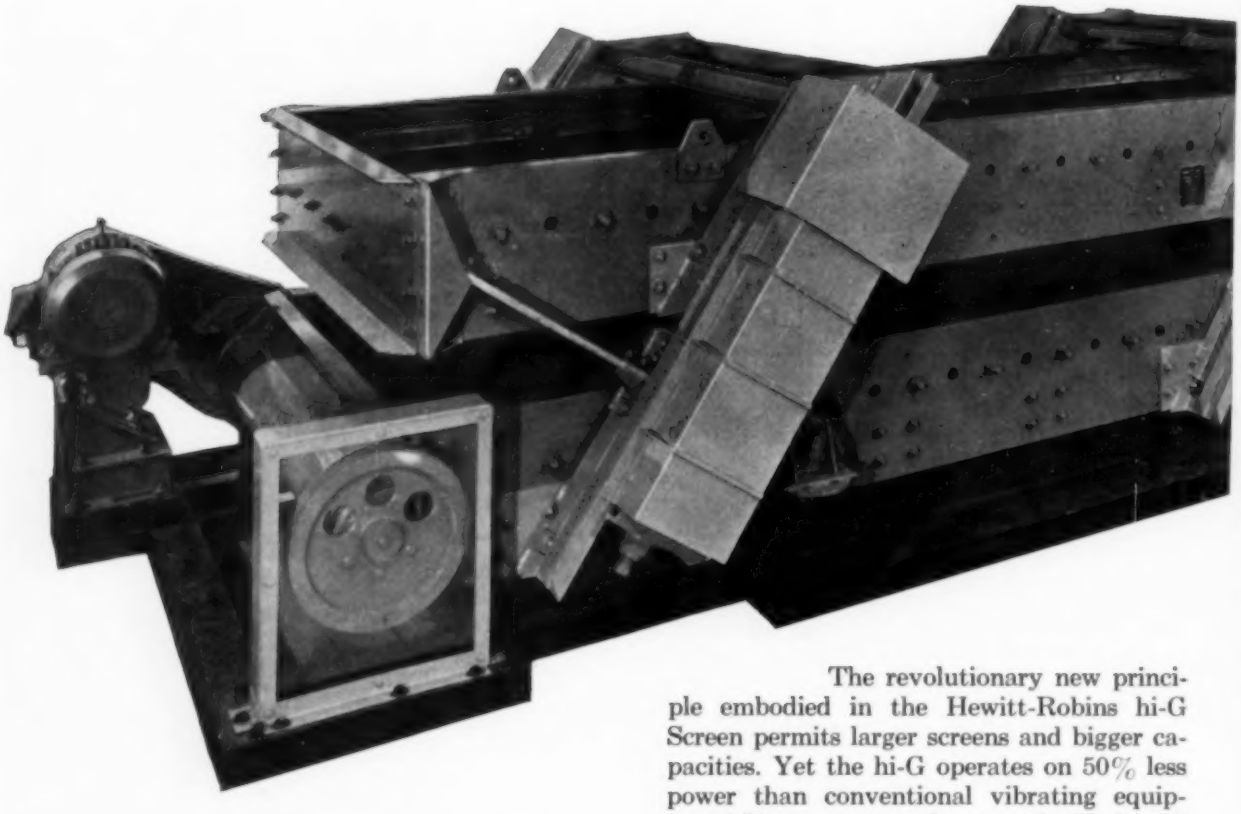
Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

HEWITT-ROBINS *hi G* SCREENS

50 Per cent Savings



The revolutionary new principle embodied in the Hewitt-Robins hi-G Screen permits larger screens and bigger capacities. Yet the hi-G operates on 50% less power than conventional vibrating equipment! Even screens as large as 6' wide by 28' long require no more than a 20-HP drive.

Featuring an unusually sharp screening action, and a choice of stroke and speed combinations, the hi-G can be made in larger sizes than any other vibrating screen on the market.

New "Modified Resonance" Principle

Utilizing the principle of "modified reso-

INDUSTRIAL DIVISIONS
PRODUCTS

VIBRATING SCREENS • VIBRATING CONVEYORS

CONVEYOR BELTING • CONVEYOR MACHINERY

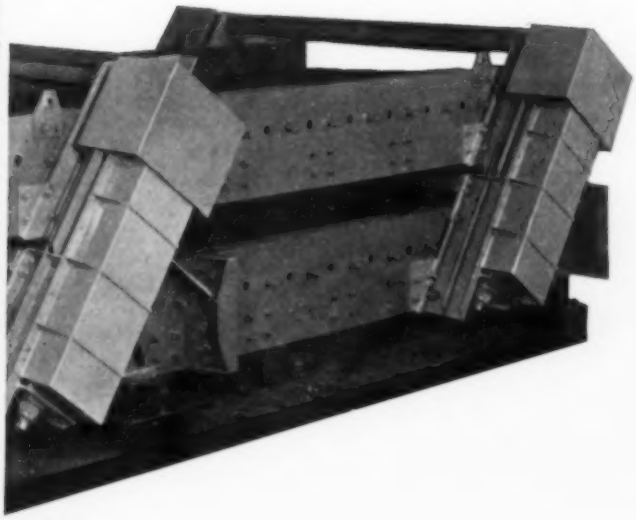
INDUSTRIAL HOSE • DESIGN, MANUFACTURE, ENGINEERING AND ERECTION OF COMPLETE BULK MATERIALS HANDLING SYSTEMS

"GLIDE RIDE" THE NEW MOVING SIDEWALK

HR **HEWITT**

STAMFORD,

SAVE POWER *Possible*



nance," the new Hewitt-Robins hi-G Screen develops a controlled, extremely sharp vibrating action. This resonance is induced by a relatively small mechanical exciter producing powerful vibrations with added "kick" to separate materials according to size.

If you need larger screens—screens that operate on or near the horizontal and still screen at large openings—*screens with readily accessible lower decks for easy observation, spraypipe installation and quick cloth changes* . . . the hi-G Screen is your answer. For information about hi-G Screens and other Hewitt-Robins vibrating equipment, contact our nearest sales office or write to our offices in Stamford, Connecticut.

-ROBINS

CONNECTICUT

HEWITT-ROBINS VIBRATING EQUIPMENT FOR THE COAL MINING INDUSTRY

GYREX SCREENS. General-purpose, positive-stroke, 4-bearing screen with amazing versatility of application and an unsurpassed record for stamina in service.

STYLES M AND MS VIBREX SCREENS. Full-floating, unbalanced, pulley-type, 2-bearing screen. Offers sharp sizing of a wide variety of materials at low cost.

STYLE J VIBREX SCREENS. General-purpose screen applicable to a wide variety of screening operations. Wide range of sizes for suspended mounting.

STYLE HS HIGH-SPEED VIBREX. For fine screening applications (up to 100-mesh in some cases). Highly effective circle-throw screening action.

ELIPTEX SCREENS. Exclusive 3-way elliptical motion for sharpest sizing and most effective dewatering. Horizontal-operating flat screens.

CAR SHAKEOUTS. Both Heavy-Duty and General-Service units for unloading all sorts of materials from hopper cars faster, more efficiently and more economically.

VIBRATING FEEDERS. Fully mechanical vibrating feeder. Easy to install, operate and maintain. Extremely high capacities at very low power consumption.

SCREEN CLOTH. Wire cloth in a variety of sizes, weaves and materials for virtually every sizing, separating or screening operation.

FOR SERVICE AND INFORMATION ON BELTING AND HOSE CALL YOUR LOCAL HEWITT-ROBINS INDUSTRIAL SUPPLY DISTRIBUTOR LISTED IN THE "YELLOW PAGES"





Shuttles underground *without turning*

There's no room to turn in this mine tunnel — and no need to turn. Koehring Dumptor drives up to the tractor-shovel, body forward, gets its load — and then shuttles back out of the tunnel at the same speed as it entered. Dumptor operates with equal ease in either direction. It gets this no-turn operating advantage through a constant-mesh transmission that gives the same 3-speed travel forward and reverse. Dumptor no-turn hauling has gained wide acceptance in both underground and strip mining, as shown on these pages. It solves problems of operating along overhead trestles, on open-pit ledges, narrow haul roads — is especially practical for stockpiling. There's an important production advantage, too. Every turn eliminated cuts 15 seconds off cycle time. This adds up to a substantial increase in yards or tons hauled per hour. For example — by saving only 2 turns on a round trip, time studies prove that Dumptor often increases hourly yardage output more than 10% on an average 1000-foot haul. Better have your Koehring distributor show you what Dumptor no-turn hauling can mean on your mine, quarry or stockpile operations. He has some facts and figures that will interest you. Call today.



Elevated haul-way — On extensive stockpile operation, Koehring 6-yard Dumptor shuttles along overhead trestle. It travels from mine headshaft to edge of stockpile, dumps, and returns for next load — never turns. This trackless method replaced lorry cars at several mines. Some Dumptor owners set up access ramps, instead of using trestle systems.



Dumps in one second — Dumping off end of hillside trestle, operator drives up to hopper, trips the body-release lever, and *gravity* dumps the 6-yard load instantly. One second later, Dumptor is on its way back. There is no 15 to 25-second wait for slow-acting body hoists. Koehring *gravity-dump* works every time — never balks, and never wears out.



Big production team — Working with Koehring 1½-yard shovel, Koehring Dumptors are loaded with body forward, ready to travel and dump without turning. These heavy-duty haulers have better than 6 h.p. for every ton of loaded weight — accelerate fast, pull through soft ground, up grades and ramps with less shifting — climb 24% grades fully loaded.



Stockpile specialist — Dumptor puts stockpiling on a fast shuttle-haul basis — eliminates turning at the loader and on top of the pile. Notice how instant dumping action kicks the load out over edge of pile — saves a lot of dozer clean-up. Free-swinging kick-out pan breaks load suction in wet materials, bolts down to floor when handling rock.

KOEHRING COMPANY, Milwaukee 16, Wis. Subsidiaries: PARSONS · KWIK-MIX · JOHNSON KOEHRING HEAVY DUTY 5544

Haven't you, too, decided now . . .

Conversion Pays

PERHAPS you have already had Lee-Norse convert some of your track-mounted equipment to trackless . . . or perhaps you have heard about Lee-Norse conversions from others who know from experience "It's Smart to Convert." No matter, we think you know by now that Lee-Norse can give you

TRACK to TRACKLESS
Economy for LESS . . .



CONVERTED GOODMAN
460 OR 360 LOADER

If you clearly compare - You'll quickly convert

CONVERTED JEFFREY
29U CUTTER



Yours will be a more efficient and mobile operation when your present conventional cutters, loaders, and shuttle cars move rapidly and unrestricted on rubber tires:

CONVERSION requires only a modest investment when compared with new equipment.

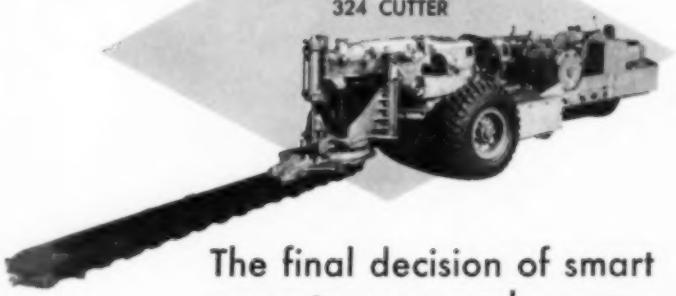
CONVERSION requires only a slight increase in spare parts stock.

CONVERSION saves re-educating your operators and maintenance crew.

CONVERSION is done in less than a month—little time lost during changeover.

CONVERSION holds obsolescence losses to a bare minimum.

CONVERTED GOODMAN
324 CUTTER



The final decision of smart operators everywhere — *CONVERSION PAYS!*

Lee-Norse Company

CHARLEROI, PA.

DESIGNERS AND BUILDERS OF THE FAMOUS LEE-NORSE MINER, PORTAL BUS AND JITNEY



No stops for shifting... *no lost momentum...*

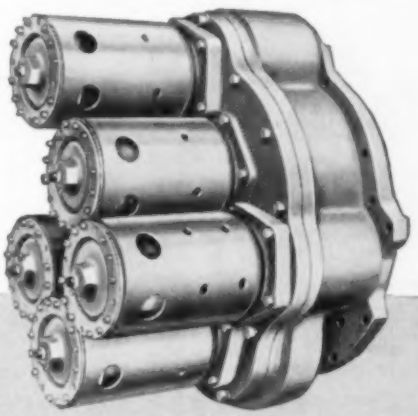
any gear ratio instantly with Constant-Mesh Transmission

Constant-mesh transmission makes a major contribution to Tournatractor's high-speed performance. It gives faster pickup for pushing or pulling scrapers, or other loads . . . permits easy synchronization of Tournatractor speed and power with that of the scraper prime-mover so two engines work as a team for fast pusher-loading. It helps you take full advantage of Tournatractor's new high speeds to handle more jobs, get more work done.

With constant-mesh transmission you eliminate depressing of a clutch foot-pedal. You have no double clutching . . . no synchronizing for meshing of one gear against another. Quick movement of a small speed selector lever transfers power instantly from one gear ratio to another.

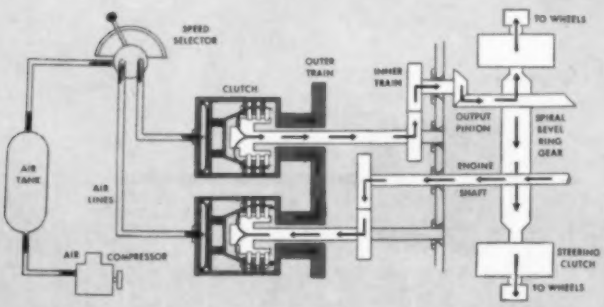
Tournatractor transmission is fully enclosed and operates in a bath of oil. All adjustment and lubrication points are conveniently located for quick, easy accessibility.

Call us to arrange a demonstration on your job. See for yourself the advantages you get from Tournatractor's constant-mesh transmission, 208 hp, 17 mph speeds, and rubber-tired mobility. See also how Tournatractor's optional, trouble-free, low-pressure torque convertor gives you the additional advantage of maximum horsepower at all times over the complete speed range.



Transmission Clutches Air-Actuated for Instant Control

Constant-mesh transmission and air clutch assembly are installed as a single unit. Clutches are mounted individually on ends of the gear shafts. Each 7" multiple disc clutch has 290 square inches of gripping surface. These heavy-duty clutches engage and release in proper combinations at a touch of the control lever. To make clutch adjustments all you do is loosen a few Allen-head screws and turn adjusting ring "in" or "out." Tournatractor also has 2 air-actuated steering clutches which are similar in principle.



Arrows trace power-flow through CONSTANT-MESH TRANSMISSION

Tournatractor—Trademark T-736-G-h

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

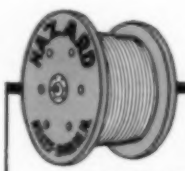


and for the same reason: MOLD CURING

Truck tires are tough. Every one of them is vulcanized in a metal mold—mold-cured—to guarantee the brute strength and toughness it must have to lick the rutted pavements, gravel roads, rubber-eating skids and tremendous loads that are part of its day's work. Thorough, uniform curing makes the tire a uniformly rugged "shoe" incorporating the strength of all the individual components.

Hazacord cables are tough, too. Every foot of every tiny flexible cord or heavy high-voltage cable is mold-cured to give service-proved "truck-tire" toughness and durability. Even, thorough curing guarantees a strong, compact cable assembly that adds to the remarkable strength of its components yet retains maximum workability and flexibility. This long-lived construction has made Hazacord the solution to difficult installations where other portable cables have failed after relatively short operating periods.

For any type of portable power distribution in industry, mines or utilities there is a tough Hazacord construction that is best for the job. Ask your jobber or your nearest Hazard representative for details or write for Bulletin CA-451, Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.



2135

HAZACORD

Mold-Cured

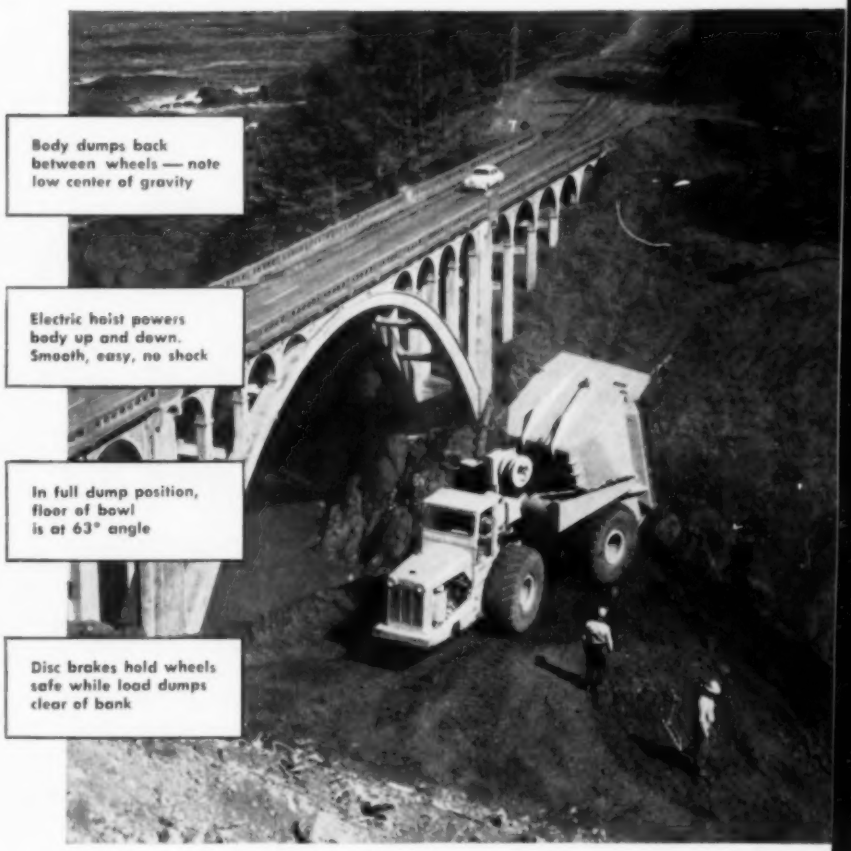
portable cables

PRODUCT OF OKONITE RESEARCH

Dumps anywhere— over-the-edge or on-the-move

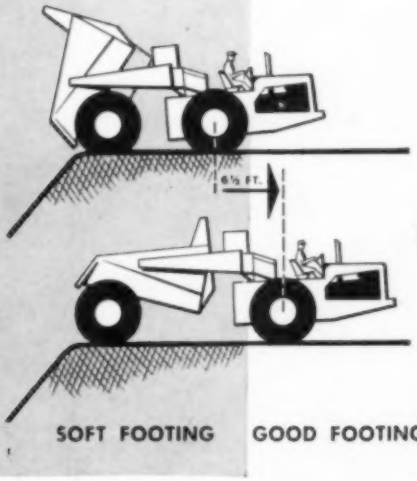
Tournapull Rear-Dumps can go anywhere—on or off-the-highway — to place loads exactly wherever you want them.

To dump over the edge of bank, all you do is back close to dump point. Rig's big single tires and power steer take you over rough footing and soft fills where many trucks can't go. Dump is made by flicking electric switch on control panel. This instantly activates hoist motor. Body "rocks" back easily over rear axle. You have power up and power down. Movement is under positive cable control at all times, can be stopped at any angle. At full dump angle, bowl lip is at ground level *behind* rear wheels. This position prevents material from rolling forward under wheels. It also provides free dump over edge of bank and greatly reduces need for dozer cleanup.



Safe at all times

In dumping, Tournapull Rear-Dumps are safer than any truck. Front-wheel-drive keeps power and traction on solid footing well ahead of rear wheels. Because body does not need to clear frame, springs, axle, or differential, its center of gravity stays low, even during dump. Oversize multi-disc air brakes — *with more braking surface on one wheel than comparable-size trucks have on all four* — prevent creeping or rolling.



Separate braking of front and rear wheels can be used with action of hoist to help front wheels pull away from edge of soft dump. In case of trouble, rear brakes are set, front brakes released. When bowl is lowered from normal dumping position, free-rolling prime-mover wheels are pushed forward. On the "C" size Rear-Dump, they move 6½ ft. — usually enough to find good footing. If front drive wheels do not reach good footing after bowl is lowered, same "leap-frog" process can be repeated. Simply pull rear wheels forward by setting front brakes and raising bowl, then set rear brakes and push front wheels ahead by lowering bowl.

Accurate spreads while moving

Tournapull Rear-Dumps can also spread on the run. Bowl can be safely raised and lowered at normal haul speed. Operator simply positions bowl for desired flow of material and continues to drive.

There's a Tournapull Rear-Dump size to fit your needs

(Now available with optional tailgate)

"D"	"C"	"B"
11 TONS	22 TONS	35 TONS
138 HP	208 HP	293 HP

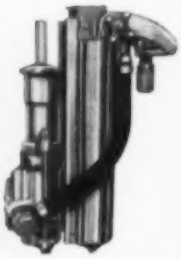
Prime-movers for these Rear-Dumps also power scrapers, bottom-dumps, flatbeds, and cranes.

Tournapull—Trademark Reg. U.S. Pat. Off. R-778-G-bw

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company



28" FEED





46" FEED



64" FEED



Remove Snap Ring



Remove Chuck

THE LE ROI-CLEVELAND S20 VAC-NU-MATIC STOPER

All models available in either SAV-A-CHANGE or Socket Type Chuck

● The new CLEVELAND S20 VAC-NU-MATIC dust collecting stoper is available in 3 feed lengths to suit any working height down to a 26" seam. *It will produce a 30" hole in a 26" seam without using coupled steel.* The 28" feed weighs 69 lbs. complete. Any model may be used either hand held or jumbo mounted. VAC-NU-MATIC bits are fast and free cutting and eliminate all stuck steels. Dust collection is positive even in wet top. Chucks may be replaced without dismantling the machine, using only a pair of snap-ring pliers. Cuttings are removed at the chuck housing and do not pass through the machine. Write for bulletin RD32 or let us demonstrate in your own mine.

For sales, service, information or demonstration in Pennsylvania and West Virginia contact: Schroeder Brothers — 3116 Penn Ave., Pittsburgh, Pa. or Acme Machinery Co. — Williamson, W. Va. In the Birmingham district contact Equipment Service Co., 617 North 9th St., Birmingham, Ala., or contact us direct from anywhere.



LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

Manufacturers of Cleveland Air Tools



PORTABLE AIR COMPRESSORS



TRACTAIR



STATIONARY AIR COMPRESSORS



AIR TOOLS



ENGINES

RD-75



What the

H & P CYCLONES

are doing for the

COAL INDUSTRY

CHECK THESE ADVANTAGES!

- ☐ Closed circuit operation
- ☐ Recovery of fine coal
- ☐ Prevention of stream pollution
- ☐ Controlled washing water densities
- ☐ Conservation of water
- ☐ Sharp classification for washing operation

H & P Cyclone installations pay for themselves in unbelievably brief periods . . . by reducing the load to, or entirely eliminating sludge ponds, and by increasing the recovery of salable coal.

Ten years of progressive research and thousands of H & P Cyclones in operation assure you of the finest cyclones engineered into the best designed clarification circuits.

We will gladly arrange for you to visit plants where H & P Cyclones have increased operating profits.

Write for Booklet CT-954.

Heyl & Patterson
INC.



55 FORT PITT BLVD. • PITTSBURGH 22, PA.
PHONE COurt 1-0750



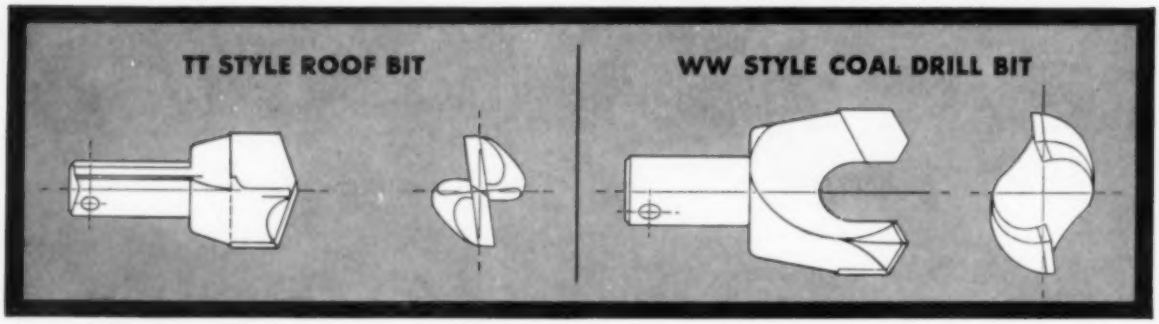
2 NEW MINING TOOL BITS

with the Strength and Wear Resistance to tackle the most rugged jobs

Latest additions to the proven line of Carmet bits are the WW Style coal drill bit and the TT Style roof drill bit.

Both types have been newly designed for faster penetration and greatly increased tool bit life.

Heavier alloy steel backing on the shanks provides support for a harder, more wear resistant grade of carbide tip. Longer wear length along the cutting edge permits full use of all the carbide before discarding the tool.



CARMET DISTRIBUTORS

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Persinger's Inc., Charleston, W. Va.
Leechburg Supply Co., Leechburg, Pa.
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W. B. Thompson Co., Iron Mountain, Mich.

★ ★ ★

Get in touch with the Distributor nearest you.

Extensive tests have proved the ability of the TT Style roof drill bit to penetrate the most rugged formations without premature massive tip fracture or excessive wear. Full feed pressures can be used on the heaviest duty roof bolters for greater production and economy of operation.

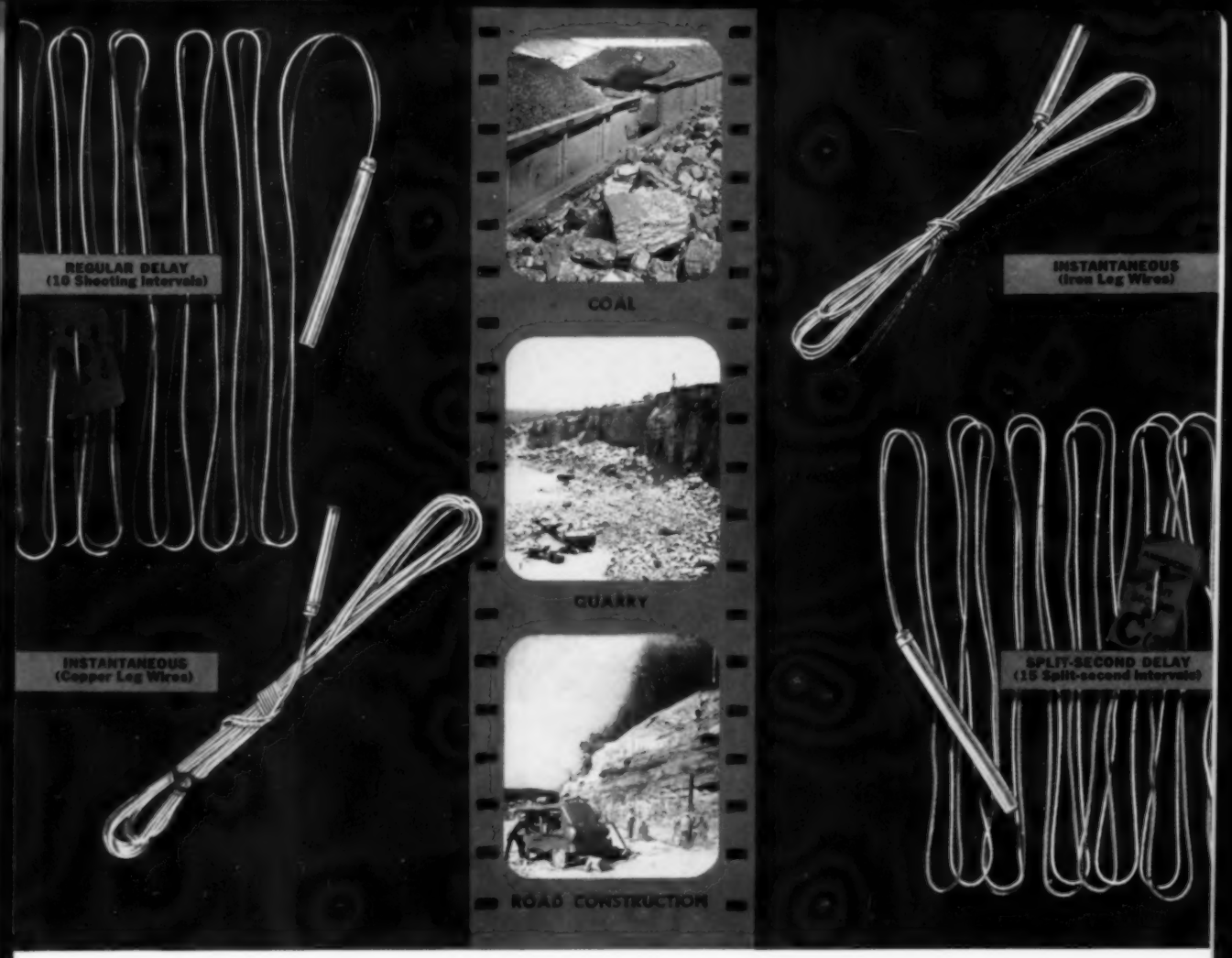
The new design of the WW Style coal drill bit allows faster penetration and easier cutting either in hand-held or power-fed drills. This bit is designed with a wide scoop for quick, easy removal of loose cuttings. Proper gage is maintained through the life of the tool, which field tests show to be double that of any competitive bit.

Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Mich.

The Original DOUBLE-BONDED Carbide Bit

CARMET® AL

WSW 6116 B



Call your shot... then call for American Electric Blasting Caps

...for American makes a cap for every type of blasting

That's right, you call your shot—instantaneous, regular or split-second delay—in coal mines, in quarries or on construction jobs. Then use American Electric Blasting Caps, for American makes the *right* cap to set your shot off dependably and economically.

And American Electric Blasting Caps also offer these positive advantages:

Choice of Delays—10 regular delay periods and 15 split-second delay periods meet virtually every timing requirement.

Timing Accuracy—the finest timing periods are produced for exact planned shooting.

Detonation Strength—more than enough to detonate most all insensitive dynamites.

Superior Insulation—five separate coats of Organosol insulation give unsurpassed electrical and strength properties.

And they're color coded for fast, sure identification.

The American Line:

High Explosives	Electric Blasting Caps
Permissibles	Instantaneous
Blasting Powder	Regular delay
Blasting Caps	Split-second delay

Blasting Accessories

If it's American, it's dependable.

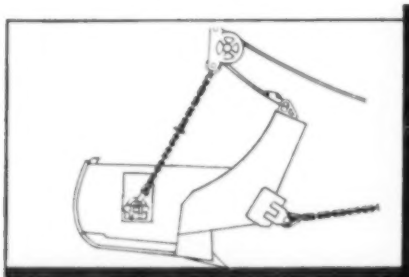
AMERICAN CYANAMID COMPANY
EXPLOSIVES

AMERICAN Cyanamid COMPANY
EXPLOSIVES DEPARTMENT
30 Rockefeller Plaza, New York 20, N. Y.

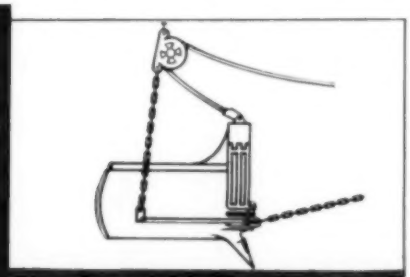
Sales Offices: Latrobe, Pa., Pottsville, Pa., Scranton, Pa., Maynard, Mass., St. Louis, Mo., Bluefield, W. Va.

...Here's Why Page AUTOMATICS Outperform Ordinary Buckets...

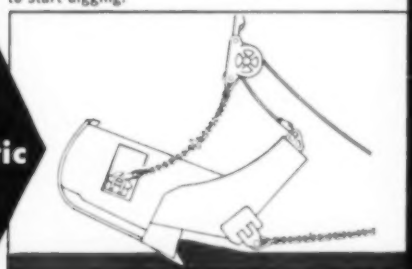
Page Automatic Bucket Action



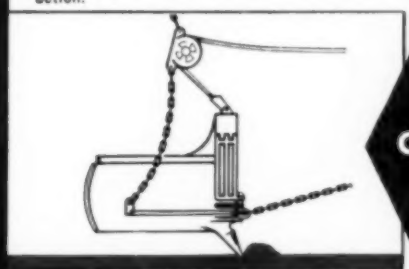
STARTING FROM FLAT POSITION, automatic is ready for pull — no need to drop it on its teeth to start digging.



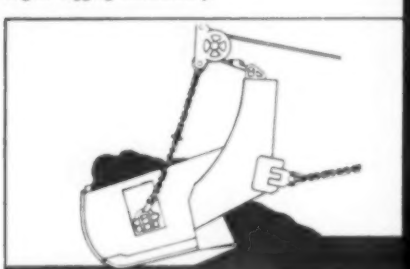
Ordinary bucket's weight is evenly distributed . . . depends on sharp angle of teeth to begin digging action.



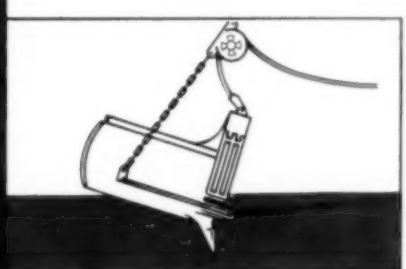
FIRST PULL ON LOAD LINE automatically shifts full weight of Page Bucket to the teeth and bucket begins digging immediately.



Bucket is dragged until teeth catch or snag on soft ground or projection before digging in.



CONTINUED PULLING LOADS BUCKET — weight of load shifts center of balance to the rear, causing the bucket to come up **automatically** as it finishes loading. Completely filled in 1 or 2 lengths, bucket is ready for fast hoist and dump.



Sharp angle of teeth and flat balance of ordinary bucket cause it to keep digging in as pull is continued. Bucket must be jockeyed and pulled loose from ground before hoisting.

This is how Ordinary Buckets Work

AUTOMATIC'S DIGGING ABILITY PAYS OFF IN GREATER PRODUCTION

The test of a dragline bucket's value to you is the yardage it can handle in a given time. Page Automatic Buckets *will produce more yardage per rated capacity than any other bucket.* Let us give you a demonstration. We will put the right Page Automatic on your machine and prove that it will increase production by as much as 10 to 25%.

Write us for details and Bucket Catalog GPB454. There's no obligation.

Page

Automatic Dragline Buckets

Walking Draglines

If it's a Page... It DIGS

PAGE ENGINEERING COMPANY CLEARING P.O. CHICAGO 38, ILLINOIS

B-3106

Pennsylvania Mine Reports...

Long Piggyback System helps boost average tons per face man by 250%





The LONG Mobile Conveyor Drive permits moving the conveyor head, pictured above discharging coal into a LONG Gathering Conveyor, from one location to another under its own power.

The Piggyback Conveyor, shown at right, provides continuous transportation from the face to the outside because it eliminates lost time for car changes.

At this Pennsylvania mine, LONG Piggyback* and Mobile Room Conveyors are being used to service two continuous mining machines in a seam that varies from 34-inch to 42-inch in height. Average production has been boosted 250% per face man per shift, and face advance has been stepped up from 5 to 90 feet per shift.

In commenting on his company's experience with the Piggyback Conveyor System, Mr. Charles Richardson, superintendent at this mine, says, "Our LONG equipment has practically eliminated spillage and supplies an uninterrupted, steady stream of coal to the processing plant. We feel that this continuous haulage system, in combination with efficient overall planning, and the use of continuous mining machines, has been largely responsible for helping us change this operation from a non-profitable one to the point where it is making money."

Results like this are typical with low-investment, low-maintenance Piggyback Mining—whether used with conventional loaders or with continuous mining machines. In case after case, this unique system has meant far more tons per man, much lower operating costs, and greatly increased profits. We'll be glad to supply facts and figures.

*Trade Mark

For complete details or a demonstration, write ...

The LONG Company
OAK HILL, W. VA

In Ohio . . . . and the World Over

Bucyrus-Erie Ward Leonard
Electric Excavators

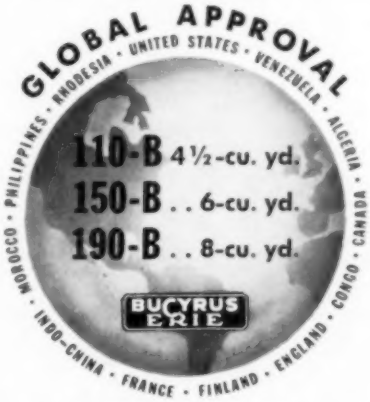
KEEP COSTS DOWN . . . KEEP OUTPUT UP



Bucyrus-Erie Ward Leonard electric excavators are helping coal operators everywhere with their modernization plans to boost output while cutting costs. For example, the 150-B shown above is loading unshot coal for the Sunnyhill Coal Co., near Lexington, Ohio.

These modern machines are designed to meet today's production problems. The front end has plenty of strength without dead weight — material can be moved with less effort and power consumption. Ward Leonard control provides rapid acceleration and deceleration to help achieve high-speed digging cycles. There is plenty of extra torque and ample usable power when most needed.

Plan to bring the advantages of these modern shovels to your operations. 91L56



Bucyrus-Erie Company

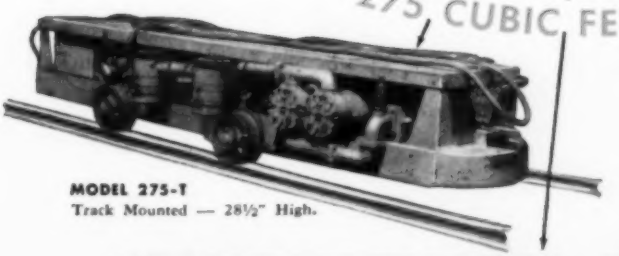
South Milwaukee, Wisconsin

ACME MINE COMPRESSORS–

Rugged • Dependable • Maneuverable • Self-Contained

... *and* VERSATILE

275 CUBIC FEET OF AIR



MODEL 275-T
Track Mounted — 28½" High.



MODEL 275-S
Low Coal Special — 29" overall — Less if it is to be mounted in a carrier.



MODEL 275-SPRHS
Rubber Mounted — Self Propelled. Two stoper Jumbo Arms with stopers and dust collectors — 54½" high with 9" ground clearance.



MODEL 275-TD
Track Mounted — 2 Drifter Jumbo Arms and Heavy Duty Drills for Rock Work. Arms may be interchanged with stoper Jumbo Arms.

One of these machines will fit YOUR mine conditions.
Variations such as with or without cable reels, variable ground clearance, seats, etc. are available. Full hydraulic drive and steering. Parking and tramming brakes.

Write or call us and let us quote on your requirements —
We will be glad to demonstrate in YOUR mine.

ACME *Machinery Company*

WILLIAMSON, WEST VIRGINIA

Now! New Heavy-Duty V-8's!



With the most GO under any truck hood!

Powered for the most rugged mining operations!

These new 206, 226, 257 hp. modern truck V-8's in the new INTERNATIONAL V-Line have the "built-in" reserve power that gets your biggest loads moving *fast* . . . the lively response that keeps them rolling with shifting greatly reduced, even on the toughest off-highway operations. You save operating costs and you save trip time.

In short, the new INTERNATIONAL V-Line is built to set new highs in your profit column!

Tested and proved as no other trucks have ever been!

Developed and tested in the lab, then put through more than 1,000,000 test-track miles, and in 2,500,000 on-the-job miles in 39 different truck vocations.

These tests were made by profit-minded truckers with a gimlet-eye on mileage, hauling time and repair bills. Their conclusions—"GREAT, on every count!"

3 Great New INTERNATIONAL V-8 Engines!

	V-401	V-461	V-549
Displacement	400.9 Cu. In.	461 Cu. In.	548.7 Cu. In.
Bore and Stroke	4⅛ x 3¾	4⅛ x 4-5/16	4½ x 4-5/16
Maximum hp.	206 @ 3600	226 @ 3600	257 @ 3400
Maximum Torque	355 @ 1800-2000	420 @ 1600	505 @ 2000

Pressure Controlled-Flo Cooling! Full circulation, fully controlled. Cold weather by-pass.

"Wet" Replaceable Exhaust Valve Guides!

Exhaust Valve Faces and Seats of Stellite!

19 Pound Aluminum Flywheel Housing!

Get all the facts behind this great new truck story. Send for booklet "New Heavy-Duty V-8 Power Where You Need it Most." Write INTERNATIONAL HARVESTER COMPANY, P. O. Box 7333, Chicago 80, Illinois, or see your INTERNATIONAL Dealer or Branch.

INTERNATIONAL TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Construction Equipment
McCormick® Farm Equipment and Farmall® Tractors

IT PAYS TO specify WHEAT ELECTRIC CAP LAMPS



BECAUSE with WHEAT . . .

you benefit by:	. . . and avoid:
• FULL-SHIFT ILLUMINATION High percentage of initial light efficiency right through the end of the shift	Light levels which lower appreciably during the shift
• CONTINUOUS HIGH-LEVEL EFFICIENCY Low initial cost permits battery replacement as needed assuring continued new lamp performance	The penalty of dwindling efficiency and poor performance just to obtain long life
• TRUE AUTOMATIC CONSTANT-POTENTIAL CHARGING Charging is regulated automatically without manual attention on the part of the lampman	Costly manual attendance and variable charging
• MINIMUM MAINTENANCE Weekly watering, bulb replacement and ordinary cleanliness	Refilling leaky cases, valves to see, terminals to clean, lamps to refocus, bulbs to replace
• LEAK-PROOF BATTERIES Regardless of position, electrolyte cannot escape	Burns from electrolyte
• LARGE BATTERY CAPACITY Yet small compact battery weighs only 64 ounces	Short cycle battery life and excessive weight

the trend is to WHEAT!

National Mine Service Company

564 ALCOA BUILDING PITTSBURGH 19, PA.

Call your National Mine man for the facts!

ALL-STATE DIVISION
Logan, W. Va.

ASHLAND DIVISION
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KY.-VA. DIVISION
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ANTHRACITE DIVISION
Forty Fort, Pa.

BIMACO DIVISION
Beckley, W. Va.

WESTERN KY. DIVISION
Madisonville, Ky.

WHITEMAN DIVISION Indiana, Pa.

NEW 8-WHEEL SANFORD-DAY

95 S-D 8-WHEEL AUTOMATICS INSTALLED UNDERGROUND!

PROBABLY THE LONGEST BOTTOM DUMPING mine cars ever to be installed underground—each is 30′ long, 7′ wide and 4′ high. They were built for Harmar Coal Company's Oakmont Mine, Barking, Pa., jointly owned and operated by Pittsburgh Consolidation Coal Co. They were designed to achieve the ultimate in weight distribution and to structurally handle loads up to 16 tons. Since large wheels do not affect capacity of our S-D 8-wheel Automatics, large 16″ diameter wheels were used for maximum wheel wear and service. Door openings are large—38″ by 37″ wide. The cars are also equipped for movement at the loading heads by barney type car spotters. In addition, these cars, as well as all Sanford-Day cars today, feature submerged arc welding for parent metal strength.—*Another example of our service to the industry in engineering, designing and building the right car to solve a haulage problem. Sanford-Day Iron Works, Inc., Knoxville, Tenn.*



SANFORD-DAY

"SUPER MARKET FOR MINE CARS" — *all types* * PRECISION WHEELS * "BROWNIE" HOISTS, CAR RETARDERS, SPOTTERS, PUMPS AND OIL SPRAY SYSTEMS * GISMO SELF-LOADING TRANSPORT that loads *(mucks)* in development or production . . . transports . . . supports 2 to 5 jib mounted drills . . . back fills . . . moves boulder rocks . . . makes its own roadways and cleans up completely — a new method of hard rock mining offering a tremendous reduction in cost per ton!

5162

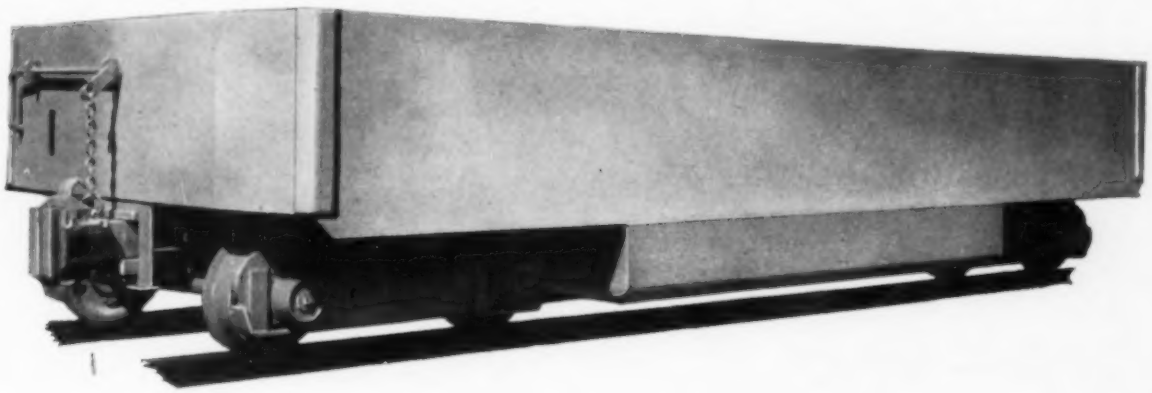
MINE CARS

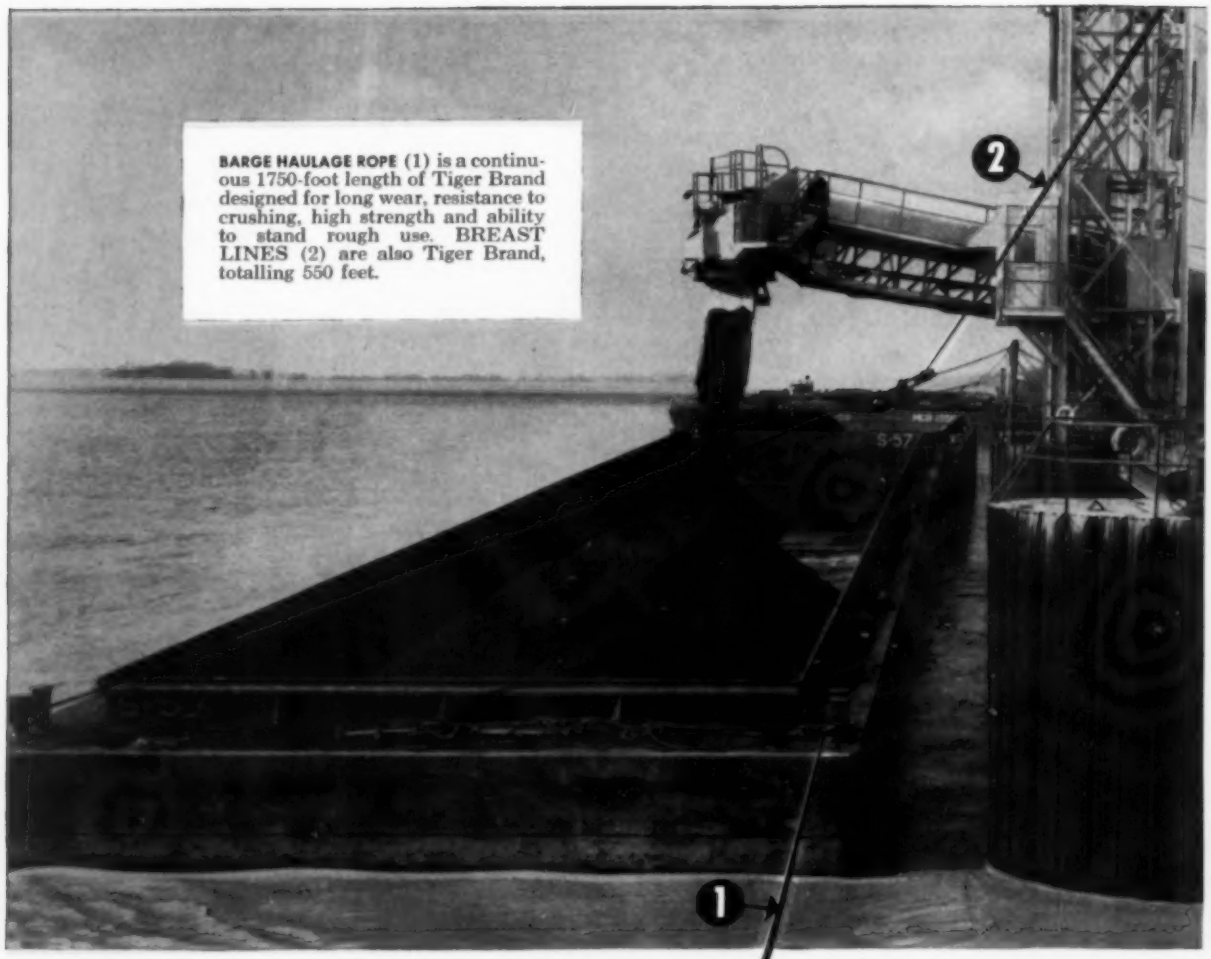


ALMOST 650 TONS OF MINE CARS SHIPPED BY BARGE. Above you see the second of two jumbo barges being loaded with Harmar Coal Company's 95 S-D 8-wheel Automatics at the Knoxville Public River Terminal. If you are on a navigable waterway, barge shipments may be of considerable savings to you.

S-D ROTARY FEATURES PARENT METAL STRENGTH THROUGHOUT!

THIS S-D 8-WHEEL ROTARY was one of several recently built for another large mining company. It is approximately 20' long, 7' wide and 42" high. It is designed structurally to carry loads up to 17 tons. It features submerged arc welding for parent metal strength — enabling our customers to place cars in service that can definitely be expected to last longer!





BARGE HAULAGE ROPE (1) is a continuous 1750-foot length of Tiger Brand designed for long wear, resistance to crushing, high strength and ability to stand rough use. BREAST LINES (2) are also Tiger Brand, totalling 550 feet.

Yankeetown Dock



15-TON BOOM HOIST rigged with Tiger Brand Rope for most economical performance.



CONVEYOR uses 13 lengths of Tiger Brand Rope for belt tensioning, counterweight, boom braces, etc.

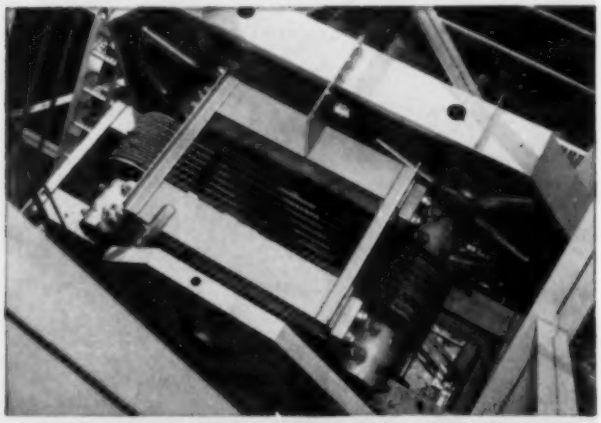


WIRE ROPE ASSEMBLY with hinged clamps for attaching barge to main haulage rope.





ROTARY CAR DUMPER is equipped with 14 lengths of Tiger Brand Rope for operating and counterweight ropes.



DOUBLE U GROOVED TRACTION DRUMS between which the barge haulage rope is reeved to form 15 parts.

loads 10,000 tons of coal per day

Unique barge haulage system operated by 1750 feet of Tiger Brand Wire Rope.

The Yankeetown Dock on the Ohio River in southern Indiana is a co-operative enterprise of the Ayrshire Collieries Corporation and the Northern Illinois Coal Corporation. It was designed to handle the output of the Wright and Victoria mines, providing barge loading of about 10,000 tons per day of processed coal.

The unique feature is the barge haulage system which uses one continuous 1750-foot length of ¾" Tiger Brand Wire Rope. This is driven from Double U Grooved Traction Drums and runs through sheaves to both extremities of the dock. From there the rope comes back unsupported to the center of the dock and is spliced to provide a continuous circuit.

The empty barges are attached to the haulage rope at the down-river end of the dock and are pulled under the conveyor chute and loaded in 1½ hours each.

The main haulage rope takes the worst beating. It is subject to immersion, chafing, and damage from crushing, in addition to bending fatigue and abrasion. For this important application, the Tiger Brand Specialist recommended the rope best fitted to give good service.

In addition to the haulage rope, the entire dock installation included fifteen other important wire rope applications on the car dumper and conveyor system. All of these were supplied from standard Tiger Brand constructions where you can always find the "Right Rope for the Job."

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

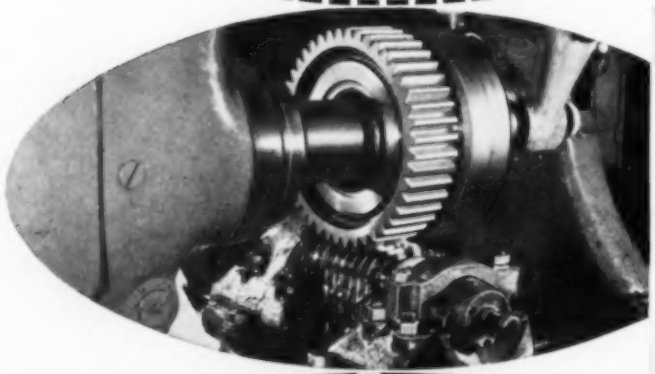
USS AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

Important reasons why it pays to use True Original Parts

Allis-Chalmers True Original Parts start right. Each benefits from one of industry's most intensive metallurgical research programs. And each is designed by experienced construction machinery engineers to do a specific job . . . with ample capacity to carry a full share of the work load just as the new equipment part did.



1

PRECISION-MADE

Skilled craftsmen bring True Original Parts to life—working with the most modern manufacturing equipment and meeting the highest industrial standards. The result: precision-made parts get full work power from your Allis-Chalmers machinery.



2

CAREFULLY INSPECTED

True Original Parts go through rigid original-equipment inspection and testing processes to assure long-life service. For example, gears are checked again and again for perfect meshing . . . for true balance . . . for full capacity.



3

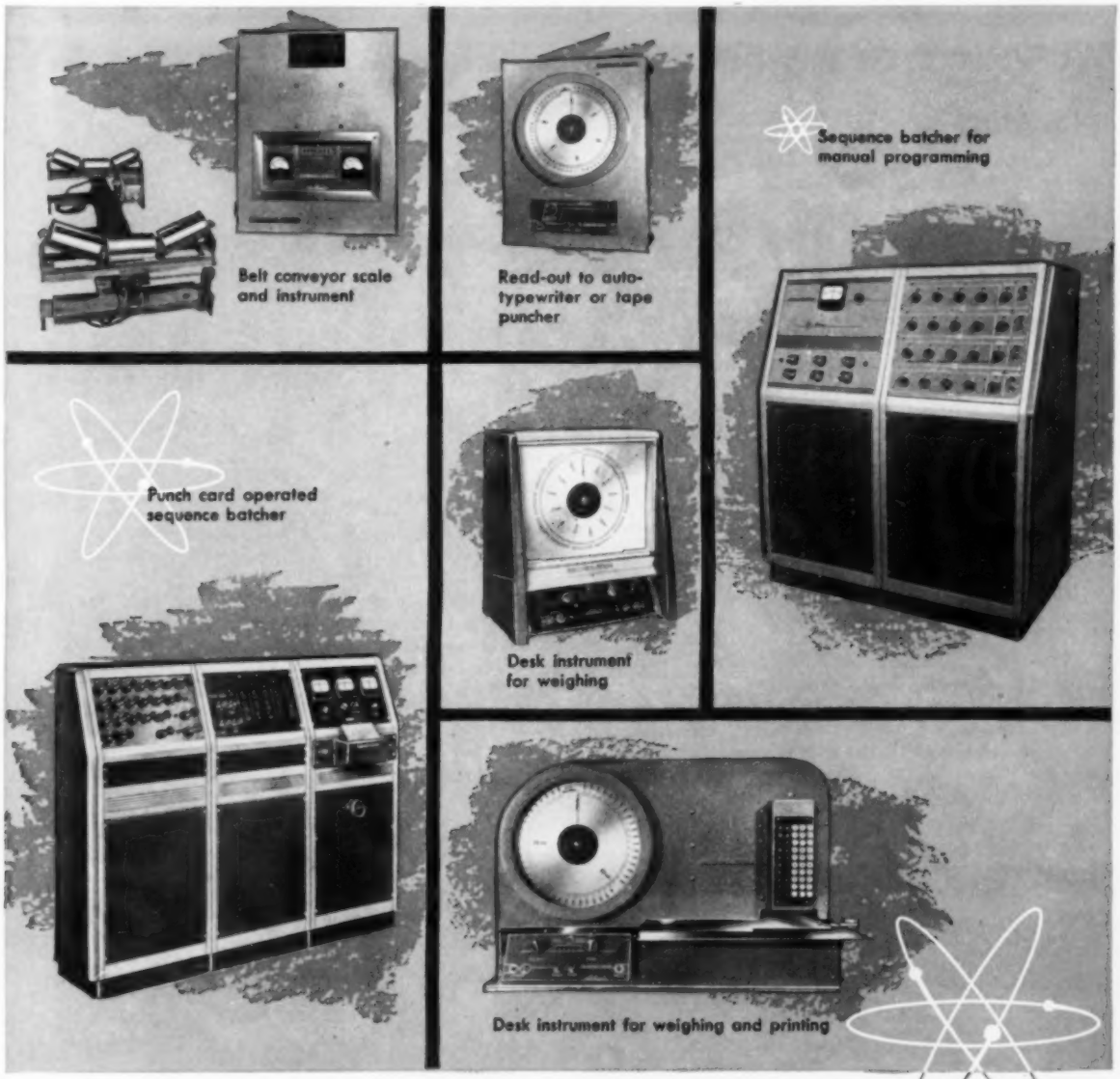
PROPERLY PACKAGED

You want your parts factory-new . . . and that's how you get True Original Parts. Many are specially treated . . . then sealed and packaged against rust, dust and damage.

A country-wide network of dealers stock ample supplies of True Original Parts. Whether you're working in one area or across the country, you can depend on reliable parts service close to your job from your Allis-Chalmers Construction Machinery dealer.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



Now...we're way beyond weighing–electronically!

The Fairbanks-Morse line of electronic instrumentation performs many functions beyond the elementary process of weighing. It will, for instance, register and record weights at a remote location. It will perform automatic sequence batching—say, from a punch card. It will translate weight messages into the language understood by automatic typewriters, automatic adding machines, tape punchers, other data processing machines. It will control a complete plant materials flow program.

This instrumentation is now available with Fairbanks-Morse truck and track scales, axle-load scales, warehouse and portable scales, and many other types of weighing machines.

The weight message is created in the electronic load cell. Fairbanks-Morse employs it in two ways. The *Full Electronic* system utilizes multiple load cells. In the *Levetronic* system, a single load cell is incorporated in a conventional lever system. (Your present lever scale can probably be converted to *Levetronic.*)

New Fairbanks-Morse literature is available on all these electronic scales, batchers and instruments. Write today. Fairbanks, Morse & Co., Scale Division, Dept. CA-7, 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

How a
New, integrated design
thwarts cable breakdowns
in Rome shuttle car cable

Long the Achilles' heel of Type G flat twin cables, the ground conductor can detract from the feature you demand most in the cable you use on shuttle cars.

That feature is the ability to take gruelling punishment week after week, month after month, without breaking or shorting.

To satisfy your demand, our engineers have designed a new Rome® parallel duplex cable.

Notice the web between power conductors and ground on the new cable. Part and parcel of the cable's tough Neoprene sheath, the web is strong but supple and resilient.

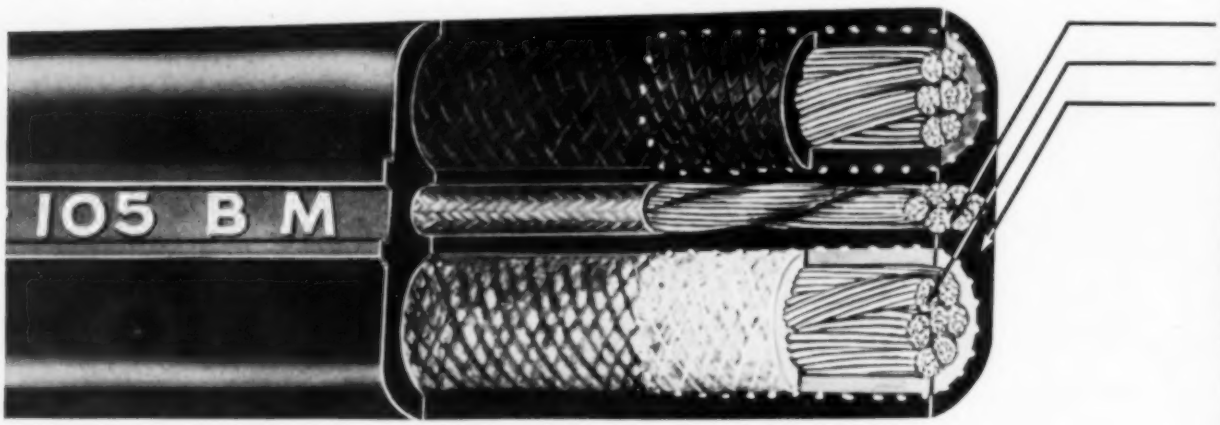
Result: sheath, web, power conductors, and ground form one, integrated unit.

2 other new features. We have increased the number of strands of the power conductors and the ground conductor to provide greater flexibility.

The ground now has a closely woven braid covering. The braid minimizes the mechanical working of the individual strands when the cable is flexed.

Free sample. Write for a 2-foot sample of the new cable. Torture it as you please. Prove for yourself that it's the most rugged, most dependable shuttle car cable you can buy.

With the sample, we'll send a bulletin describing the new cable in detail.





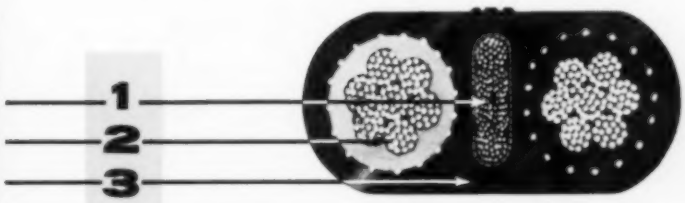
Scraping. Tire-tough compact construction, molded in lead, protects Rome 60 mining cable against abrasion.



Twisting. Firm interlocking construction prevents insulated conductors and sheath separation from twisting and bending.



You cannot bend a Rome 60 parallel duplex cable on its major axis. Sheath is so interlocked to insulated conductors, that the conductors cannot slip within the sheath when it's flexed. Result: cable flops over on minor axis when flexed, escapes the distortion and weakening of "wrong-way" bends.



Three new features of Rome 60 parallel duplex cable:

1 Ground conductor more flexible, better protected to help it withstand constant flexing, twisting, and tension. Closely woven fibrous covering minimizes mechanical working of individual strands.

2 Power conductors have greater flexibility, too. Greater number of finer strands makes them supple, less subject to damage from the rigors of mine service.

3 Neoprene sheath forms resilient web between power conductors and ground. Result: web and sheath are an integrated unit which binds entire cable securely together. Sheath cannot separate from conductors no matter how you twist or flex it.



Immersion. Specially compounded rubber insulation and Neoprene sheath prevent damage from moisture, acids and corrosion.



Crushing. Neoprene web between insulated power and ground conductors provides high impact resistance, protects against shorts.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA



puts safety first – where it counts the most!

Extensive research and development by R/M engineers to assure maximum safe operation with underground conveyor belts, now provides Fire Resistant belts in special constructions with Bureau of Mines' acceptance designation: "Fire Resistant, U.S.B.M. No. 28-10."

R/M's special Fire Resistant construction is available with all R/M brands of conveyor belt used underground, including Ray-Man . . . the belt *engineered* to outlast them all in coal mining operations! It has the *extra strength* and *flexibility* to handle the heaviest loads, even where small pulleys are required in low head room installations. Ray-Man is mildew-proof and moisture resistant. It resists gouging and tearing from large, abrasive lumps or accidental ripping . . . holds fasteners better than other constructions, even under the most severe operating conditions.

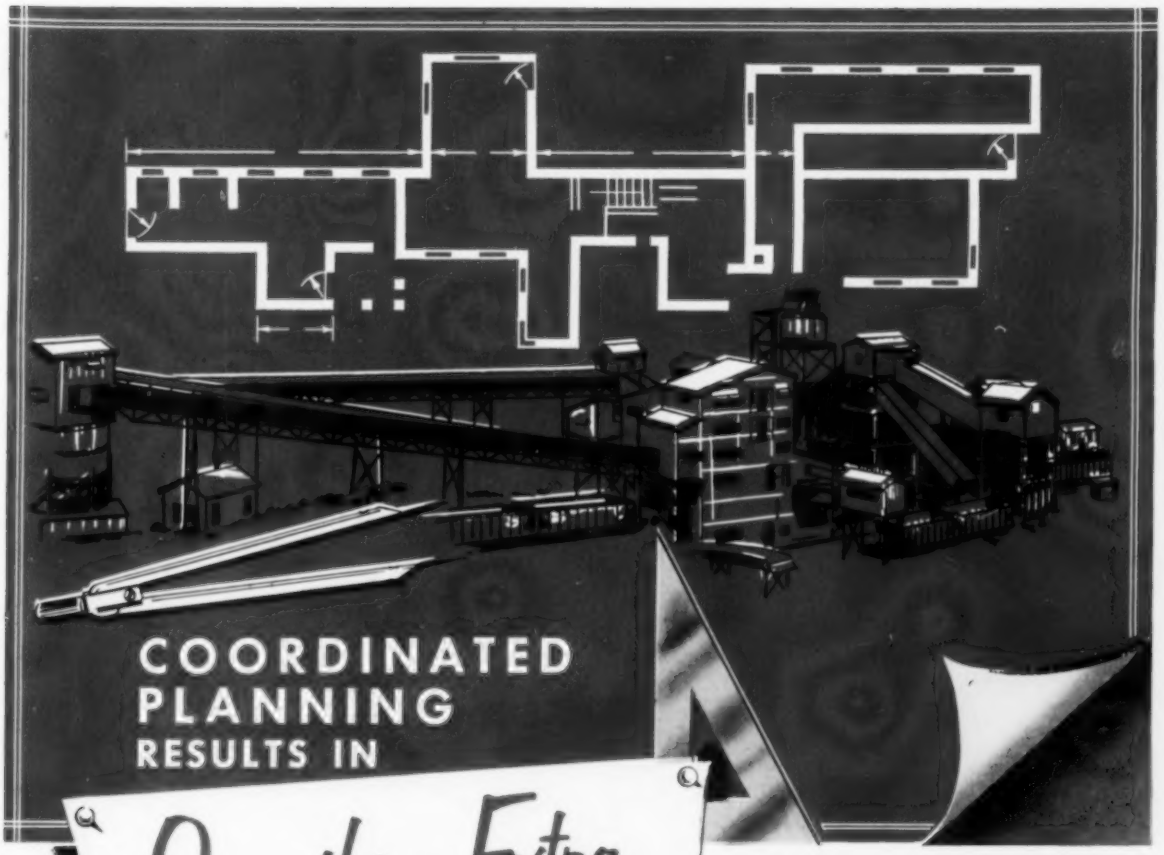
Users say Ray-Man Conveyor Belt gives them "More Use per Dollar" because it does a better job . . . and it lasts longer. Let an R/M representative show you how Ray-Man and other R/M feature conveyor belts with special Fire Resistant construction can put safety *first* on your job . . . give you "More Use per Dollar".

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls



COORDINATED
PLANNING
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Something Extra

WITH EVERY

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PREPARATION PLANT

For more than half a century Fairmont Machinery Company has been producing coal handling and preparation plants with "Something Extra"! "Something Extra" which is the direct result of painstaking coordinated planning plus responsibility. Here, then, are the reasons why a coal preparation plant by Fairmont is a model of top operating economy and notably increased separating efficiency—both of which lead to the upgrading of your product . . . a vital factor in pleasing today's discriminating coal buyers.

TURN TO FAIRMONT for the "Extras" which will put you out ahead:

1. *Coordinated, qualified engineering, fabricating and erecting.*
2. *Choice of equipment best adapted to your specific requirements.*
3. *Skilled pilot crews to smooth out operational "know-how" of your own men.*
4. *A competently-planned installation for your present needs with provisions to cope successfully with future demands.*

If you have a knotty preparation problem—if you want a plant which will turn out a guaranteed uniform product and give you over 99% separating efficiency through a product size range of ⅛" to 10" in any tonnage capacity—

Call A FAIRMONT engineer.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

(PLEASE GIVE THIS ADVERTISEMENT TO YOUR BLASTING FOREMAN)



I'm using Primacord

"You understand . . . I don't *like* thunderstorms. No blaster does. But ever since that job in Kentucky when a direct hit failed to detonate Primacord, I make it a point to use this detonating fuse during the thunderstorm season."

Here's the reason. Primacord is an insensitive detonating fuse. It is not affected by stray electrical currents. It cannot be set off by friction, sparks or ordinary shock. It must be detonated with a blasting cap.

Primacord is used to detonate the entire load in each hole, and to connect all holes in planned sequence to produce *good digging*. A detonating cap is attached to the Primacord only after everything is ready . . . when men and machines are out of the danger zone.

Use Primacord wherever there is danger of stray electrical currents — and particularly during thunderstorm seasons.

For more information see your Explosives Supplier, or write to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Primacord — Quarrycord — Ignitacord® Safety Fuse — Blasting Accessories
Established 1836

To connect a Branch Line of Plastic Reinforced or Plastic Wire Countered Primacord with the Trunk Line

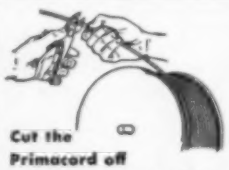
use this DOUBLE HITCH in the textile-covered Primacord Trunk Line. *Draw it up as tight as you can, and make sure that the Branch Line leads off at a RIGHT ANGLE to the Trunk Line.*

PRIMACORD®

DETONATING FUSE

PROVED AND APPROVED

P-21



Cut the Primacord off the Spool Immediately

Make this a safety habit! As soon as you have taken off the length of Primacord you need for a down-hole or for a trunkline, *cut it off the spool! Don't waste a second — do it now!*



To connect the Detonator with the Primacord Trunk Line

use FRICTION TAPE. You can detonate Primacord with fuse and cap or electric blasting cap. Lay the cap alongside of the Primacord with the business end of the cap pointing in the direction that the Primacord will detonate. Tape the two snugly together, so that you have a tight connection.

To connect a Branch Line with the Trunk Line



Use this HALF HITCH for Plain and Reinforced Primacord. *Draw it up as tight as you can, and be sure the Branch Line leads off at a RIGHT ANGLE to the Trunk Line.*



To lengthen a Trunk Line

of Plain or Reinforced Primacord, tie a SQUARE KNOT. *Draw it up as tight as you can* — it won't slip back. Caution: don't use any knot in a hole — it might break or hang up explosives when loading.

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JULY, 1956

IVAN A. GIVEN, EDITOR

Truly Significant

"THIS IS AN HISTORIC MOMENT in the coal industry. We stand as a cohesive group—the coal producers, the miners' union, the exporters and the railroads. Our unity is assurance to the free nations that coal, America's greatest and most abundant natural resource, will find its vital role in world prosperity and peace."

Thus Walter J. Tuohy, president, Chesapeake & Ohio Ry., summed up the formation of American Coal Shipping, Inc., in an address on the export trade at the meeting of the Coal Exporters' Association of the U. S., held in conjunction with the 39th anniversary convention of the National Coal Association, Washington D. C., June 13-14. Capitalized at $50 million, ACS was formed to protect and expand the market for American coal in other countries by all reasonable and economical means.

The formation of ACS is assurance that a major new market will not be curtailed or lost by failure to take the right action at the right time. It thus becomes a truly significant development in coal marketing. At the same time, its creation leads inevitably to this question: "Can action be taken on a similar scale to protect and expand internal markets?" These markets, like exports, also are scheduled for rises, and they, also like exports, present some problems the solution of which will make sure that coal benefits to the utmost in the future.

It will be observed that the capitalization of ACS is something over $1 per annual ton of expected overseas exports, which is a fair financial foundation for the new enterprise. Maybe a similar figure for an organization to protect and expand markets in the United States would be unrealistic—and maybe not. But if it is recalled that the major domestic markets are several times larger than the export market, that they have equally good or better prospects for growth, and that they present as many problems or more, the need for increased effort stands out in high relief. It is one of the big things coal can do for a really big payoff. Meanwhile, coal can try out the idea by exerting every effort to make ACS an outstanding success.

How Much?

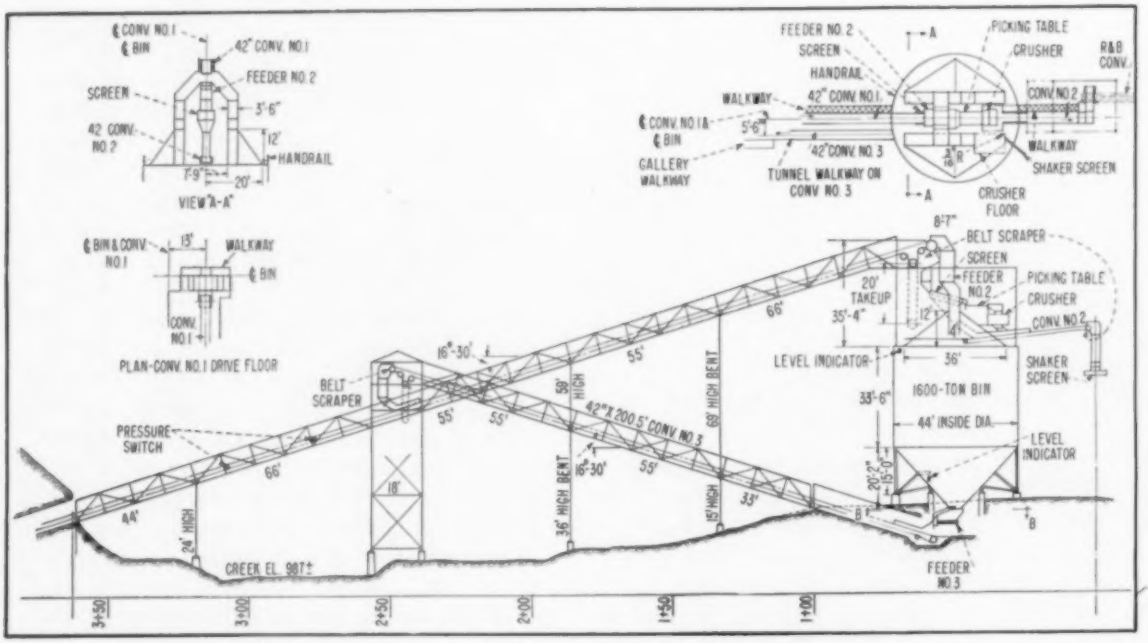
THERE IS LITTLE QUESTION that coal reserves are ample for quite a few years to come. At the same time, there is little question but that they are not as plentiful as they were in terms of future annual demand, particularly in certain regions. One region is the Ohio Valley and its tributaries, where the population still is growing, heavy industry is concentrating, and power demands are accelerating. The Middle West and South are others where activity continues to increase. It is in this area, east of the Mississippi, for example, that most of the coal consumption of 488 million tons for electric power forecast by Philip Sporn of American Gas & Electric, will be concentrated in 1975.

It will take a lot of new mining capacity to meet such new demands, and that means that substantial acreages of coal must be brought into production. Will the acreage be there? Nobody doubts that, but there is a feeling that more precise data on what actually is available on a practical mining basis is necessary for proper planning to meet future requirements. There is also a feeling that more effort will be necessary to husband available reserves by getting maximum extraction in present seams and making sure that coal hitherto considered undesirable because of thinness, partings and the like is not carelessly rendered forever unworkable. The watchwords should be precise data on available reserves and more care in mining.



EYEFILLING SCENE at Westmoreland's Hampton mines includes new slope belt, 1,600-ton storage bin, and return belt serving new mine at right. New facilities tie into preparation plant that also handles coal from No. 2 mine.

New Belt Slope Features Flexible Coal Handling



DETAILS of conveyors and 1,600-ton storage silo at Hampton No. 3 mine.

LONG-RANGE PLANS are being converted into reality by the Westmoreland Coal Co., at Madison, W. Va. Latest step in the long-range program for developing and mining a tract with reserves totaling 130,000,000 tons is the new slope at the Hampton No. 3 mine. Highlights of the new opening include the first application of aluminized steel interlocking panels to partition the slopes; a 1,600-ton steel silo storage bin; and automatic protective devices for coal handling equipment.

Located on Spruce-Laurel Fork of Spruce River about 8 mi from Clothier, Boone County, W. Va., the property entered its first stage of development in 1950 when the Hampton No. 1 mine was opened near the top of the mountain. Two years later, in 1952, the company opened a mine in the No. 2 bed, which lies 30 ft under the No. 1 coal. As a result of poor roof conditions in the top seam, the company decided to concentrate in the No. 2 seam soon after it was opened.

Both deep and strip methods were employed to recover coal from the Nos. 1 and 2 seams (*Coal Age*, September, 1953, p 82). Shortly after the No. 2 mine was opened, the company began laying plans for opening the No. 3 seam, which lies below drainage. Engineering studies indicated an average coal thickness of 59 in, good roof conditions and uniform coal quality. These favorable factors prompted top management to start development work to tap the Hampton No. 3 coal which lies 250 ft below the stream level.

The location and direction of driving the new slope were chosen so coal could be delivered to the existing preparation plant. Another important factor in choosing the slope site was the need to have the opening well above the high-water mark of Spruce-Laurel Fork.

While engineering plans were being completed for the slope and air shaft, the company signed contracts with the Frederick Engineering Co., Huntington, W. Va., for driving the 8x18-ft slope and with Eastern Gas & Fuel Associates for the 12x13-ft shaft. Work on both openings was started early in 1954. Erection of steel work for the surface facilities was handled by Industrial Engineering & Construction Co., Fairmont, W. Va.

SLOPE DEVELOPMENT

As the 16½-deg slope moved ahead, 4- and 5-ft wedge-type roof bolts were installed. When the opening intersected the coal in the first week in August, 1954, the contractor advanced headings on each side of the slope far enough so that mining equipment could be placed in full-scale production as soon as the slope was completed. The slope then was extended below the coal to provide space for a 20-ton hopper and a sump. The next step was pouring a 50-ft section of concrete from the surface to the solid rock. Then 10-gage wire mesh was attached to the sides and roof from the concrete work to the bottom of the slope. This was covered with ¾ to 2 in of Gunite to seal the walls and roof. The air shaft also was completed in August, 1954, and also was lined with concrete.

The final stage in slope construction was the pouring of a 9-ft strip of concrete 6 in thick along one side of the slope to serve as a walkway and foundation for the belt conveyor and slope partition. Work on the concrete pad was started at the foot of the slope. As pouring progressed upward, foundation bolts were set for the belt conveyor. Steel for the 20-ton hopper and belt feeder was hauled inside before any of the steel conveyor frame was set.

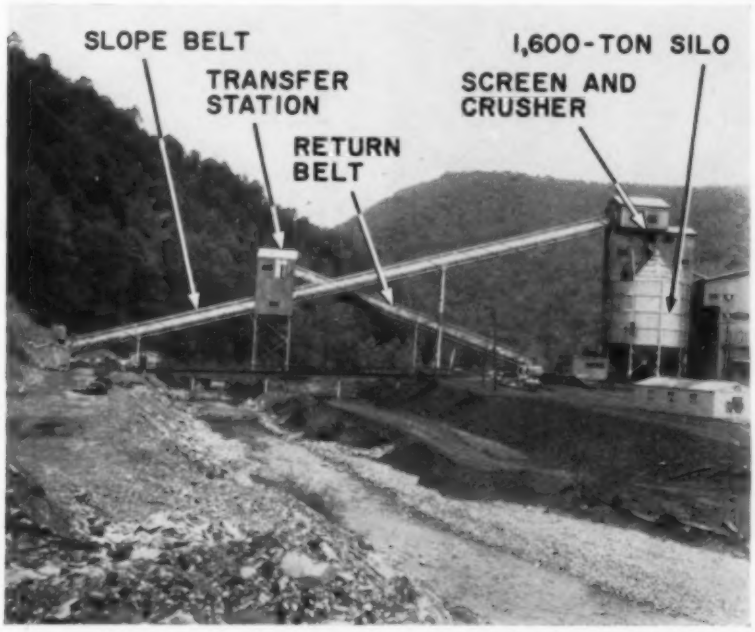
The complete conveyor frame and belting were installed, aligned and leveled before the steel slope partition was installed. To ease the walk up and down the slope a two-direction man-tow was installed beside the belt conveyor. The man-tow can be set in motion in either direction by pushing buttons at the head and foot of the slope. In addition to easing walking up and down the slope, the man-tow comes in handy for lowering small parts. Parts are placed in a bag or secured individually to hangers on the endless-chain tow and are removed at the bottom of the slope by a worker.

To provide an airtight seal between the air intake on the supply road and the belt and manway, the company erected a partition made up of Armco aluminized interlocking steel panels. Each panel was cut to fit the contour of the roof as nearly as possible before it was installed. When the partition was completed a layer of Gunite was sprayed along the tops of the sections to make an airtight seal along the roof. The application of the aluminized panels is the first time for this type of installation.

To provide support for the panels, angle iron was welded to the steel structure supporting the man-tow, and the panel sections in turn were bolted to the angle iron. When the slope height exceeded 8 ft, an extra section of angle iron was placed to increase the stiffness of the wall.

The laying of a 44-in-gage supply track completed the slope construction. The supply road consists of 60-lb rails laid on Osmose-treated ties ballasted with crushed stone.

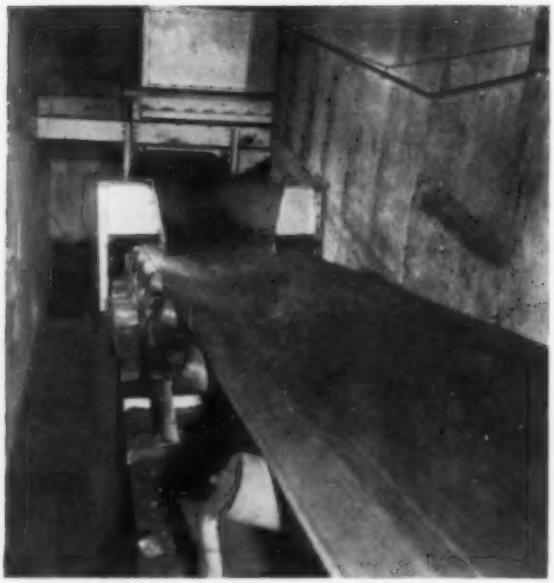
To provide temporary ventilation for the mine while openings in the coal were advanced to intersect the



HOW new surface facilities are laid out to provide maximum flexibility.



UNDERGROUND FEEDER transfers coal from steel storage hopper to slope belt for delivery to plant or storage silo.



RETURN BELT under 1,600-ton steel bin carries stored coal to transfer station feeding 42-in slope belt.

Surface Facilities Provide Smooth Coal Flow



TWIN CHUTES discharge 8x0 from overhead crusher and vibrator to belt on top of bin. Belt then carries coal to cleaning facilities in adjoining building.

airshaft, a 48-in Jeffrey fan was installed in the supply section of the slope. Air was blown down the slope, through the workings and up the belt section of the slope.

UNDERGROUND DEVELOPMENT

In October, 1955, mining was started in Hampton No. 3. Work was concentrated in Main South headings until they were opposite the air shaft. Three headings then were turned and driven 1,100 ft to intersect the shaft. The connection was made at the end of March, 1956.

While underground work was advancing to the shaft, a Jeffrey 8L-3 Aerodyne fan, capable of delivering better than 140,000 cfm of air, was set up at the top of the shaft.

After the underground workings tapped into the air shaft, mining equipment was moved back into the South Mains. As soon as all overcasts are built at the North Mains, work will be concentrated in developing them and the area to the west.

Equipment used in the initial development work included a Goodman 660 loader, Joy 11-RU cutter, 6-SC and 42E shuttle cars, Fletcher roof-bolter, 30-in belt conveyor and Schroeder hydraulic coal drill.

Headings are driven 16 ft wide on 50-ft centers and roof bolts are set on 4-ft centers as coal is extracted. Bolts are 30-in expansion-shell units made of $\frac{5}{8}$-in high-tensile steel and are installed with 6x6x$\frac{5}{16}$-in bearing plates.

Coal is undercut to a depth of 8 ft and sheared on the right rib. Bowdil throwaway bits are used on the cutter chains. Each cut of coal is broken with an average of 16 sticks of du Pont Lump Coal C, distributed in two rows of blastholes. Four holes are drilled in the top row and three in the bottom one.

A 42-in Hewitt-Robins belt conveyor, traveling 320 fpm, elevates the coal from the hopper at the foot of the slope to the surface. Coal is carried on 6-ply Ajax Raynile mildew-treated belt. Slope length is 1,255 ft and the vertical lift is 340.3 ft. The belt is driven by a 250-hp 440-v Crocker-Wheeler motor transmitting power



SLOPE PARTITION is made of aluminized steel interlocking panels. Installation is said to be the first one using this type of material.



SUPPORT for panels is angle iron welded to columns supporting tow.

Interlocking Steel Panels Divide Slope

through a Falk speed reducer.

Two safeguards prevent backward runaway of the belt. The first is a Falk No. 60 backstop which is connected to the speed reducer. The second is a One-Way clutch which is attached to the main-pulley shaft.

The belt has a vertical curve at the lower section near the hopper which tapers the grade to 4 deg with the horizontal under the 48-in Hewitt-Robins feeder. This permits coal to come to rest before it starts its trip up the slope.

SURFACE STORAGE

When the coal reaches the surface it may be dropped into a 1,600-ton Hewitt-Robins steel silo storage bin or fed to a 6x12-ft single-deck Vibrex screen which removes the 8x0 and discharges the lump coal onto a picking table. The lump product then flows to a two-stage Gundlach crusher for reduction to 8x0. The crusher product and 8x0 from the Vibrex drop onto a 42-in Hewitt-Robins belt which then carries the mixture to the preparation plant.

Coal from the slope belt also can be easily diverted to the 1,600-ton bin by stopping the feeder to the Vibrex screen. Coal fills the feeder and then overflows to two chutes which discharge into the bin. Thus by stopping or starting one unit coal can be sent either to the cleaning plant or to the storage bin.

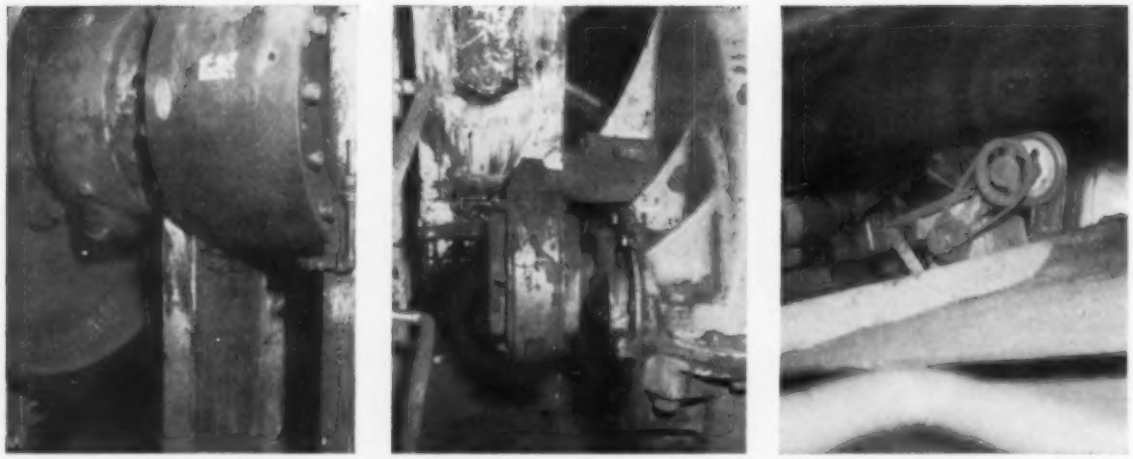


SMOOTH WALL greets eye from supply side of slope. Sand-cement mixture makes air tight seal where interlocking panels meet roof.

The 1,600-ton bin permits the mine to operate two shifts while the preparation plant operates only one. It also increases the overall efficiency by permitting the mine and cleaning plant to operate independently. If no coal is coming out of the mine, the plant can draw from the bin. If there is a delay in the cleaning plant, coal can continue to flow to the surface and be discharged into the 1,600-ton bin.

FLOW CONTROL

A group of RoBINtronic bin-level indicators controls the coal flow to and from the 1,600-ton bin. For example, if the coal level becomes too low the controls stop the feeder under the bin. If the bin reaches the full mark, the slope belt and feeder are



SLOPE-BELT PROTECTION against runaway and slippage is provided by a special clutch on drive pulley (left), backstop connected to the speed reducer (center) and centrifugal switch (right). Belt also has emergency-stop control.

These Protective Devices Prevent Belt Damage



HIGH-VOLUME FAN, installed at air shaft, serves new slope mine. Unit is capable of delivering 140,000 cfm of air.



REVERSIBLE MAN-TOW eases walk up and down slope. Unit also comes in handy to lower small parts into mine.

stopped. Indicator lights in the plant panelboard also warn the operator of these conditions.

Three level indicators also are installed in the underground hopper. One stops the feeder to the slope belt when the coal falls to a low level; another stops the mine belt when the hopper becomes full; and the third starts the slope feeder when the coal reaches a predetermined level. The slope belt runs through the shift unless the 1,600-ton bin is full.

To provide positive protection for the slope and return belts, Ensign switches are installed in the control circuit. A centrifugal switch interlocked with the underground feeder prevents the feeder from operating unless the slope belt is moving. The two-stage crusher and the return belt also cannot be operated unless the slope belt is running.

To assure a continuous flow of coal to the cleaning plant when no coal is coming up the slope, two Ensign roller-actuated micro switches start the No. 3 return belt which then feeds coal from the 1,600-ton bin to the slope belt. These also prevent the No. 3 return belt from running when the slope belt is loaded.

Centrifugal switches on the slope belt provide slip protection and prevent starting of the return belt when the slope belt is not running. Slip protection for the return belt also is provided by a centrifugal switch.

An Ensign emergency-stop control unit extends along the slope belt so that the belt can be stopped at any point along its length. The belt can be stopped merely by touching two bare wires together. The emergency stop control operates at a voltage provided by dry cells and is not hazardous.

C. J. Robinson is general superintendent of Westmoreland's West Virginia mines. Assisting him at Hampton No. 3 mine are Lawrence Sutton, superintendent; W. M. Hanlon, resident engineer; B. E. Jarrell, mine foreman; M. H. Coffey, chief electrician; and R. D. Roseberry, chief clerk.

The Coal Commentator

Company Abroad

What there is about natural gas that is so attractive to politicians probably will be something a coal man will always find it difficult to understand. Here in the United States the pipe-line and distributing companies have found many people in public life eager to help in the process of condemning markets through pipe-line construction certificates, and also in holding them by such devices as preventing gas field prices from seeking their natural levels.

Now the U. S. coal man presumably will have company abroad, since Canada is going down the same road—only more so, since Canada is building not only part of the line for the operators but is loaning them the money to build the remainder. The excuse is the need for power, even though pipe-line economics negate any large and long-continued use of gas for power purposes.

Prophecy: Canada, too, will find it paying much more than it expects for energy from natural gas, while contributing to the waste of a resource that would provide immeasurably greater benefits if reserved for other uses—chemicals, for example.

Two at a Time

The mining of two seams, one over the other, on the same property, is not too common but at the same time is not too uncommon. But the practice probably will be more common in the future, since all veins of reasonable mining thickness are becoming more valuable as the level of demand rises, particularly for metallurgical and steam coals. **So, if there is a second seam on the property, and plans have not already been made for its recovery, a reasonable effort should be made to see if recovery is feasible, even if the lower seam, for example, has already been mined and caved.**

All of which leads up to the fact that a new publication is now available to help in deciding when and how to work satellite seams, and to help in possible revisions in methods where such work already is going on. It is "A Study of Problems Encountered in Multiple-Seam Coal Mining in the Eastern United States," by David Townsend Stemple, research fellow, Dept. of Mining Engineering and Virginia Engineering Experiment Station, Virginia Polytechnic Institute, Blacksburg, Va. Address the institute for copies of the bulletin.

Ramps Omnia Vincit

The Strouds Creek & Muddlety R.R., a new and fancy name for the old Tioga Lumber Co. road, is distinguished, among other things, by the fact that it runs past what once was the farm of one of your commentator's grandparents in its journey of approximately 4 miles behind a Shay-type locomotive from Allingdale to Tioga in what is now the Nicholas-Webster coal field of West Virginia. With the rise of coal, the S. C. & M. was rescued from almost certain oblivion, and has come up in the world to the point where it sports a public-relations department. The latest release by said department is on the 1956 crop of ramps along the right-of-way—the ramp being a vegetable that is neck-and-neck with asafetida in reducing the tendency to dally in closed rooms, after, say, school is out. Exuding nostalgia, we quote in part from the S. C. & M.:

"Ramps are a sort of wild-wild onion. It is widely held that a freshly pulled ramp is one of nature's most delicious edibles—widely held in West Virginia and parts of North Carolina, that is," where "ramps are declared to be beneficial to the health as well as endowing strength and vitality." Another view of the ramp, however, prevalent in all 46 other United States, is less favorable. Proponents of this view allege that the aroma of a ramp, raw or stewed, is capable of asphyxiating small animals at 20 paces—humans at 10—and that it will corrode ferrous metal in less than 15 minutes . . .

Anyhow, the ramp crop is in along the Strouds Creek & Muddlety, and your commentator yearns for another crack at them—or does he?

Orchids to Lynch

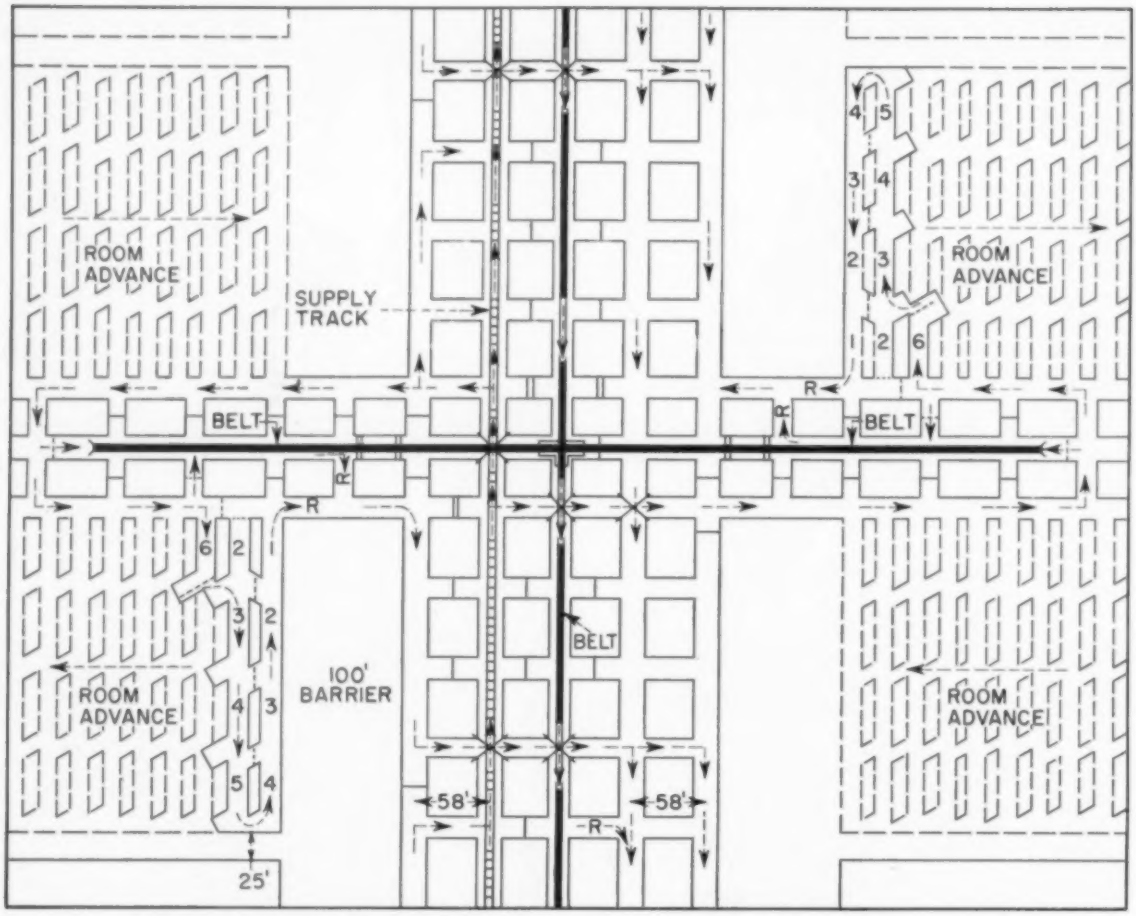
Those who may still have some slight doubts about coal's ultimate position now can gain some added reassurance from the fact that coal salesmen are receiving awards for prowess in the market place. It's a fact. D. Jerome Lynch, of the Koenig Coal & Supply Co., Detroit, recently was presented with an "Oscar" by the Detroit Sales Executive Club. Why? He sold twice as much NEW tonnage as any other Koenig representative.

So, orchids to Lynch. May his tribe increase, and the NEW tonnage grow by leaps and bounds, not only in Detroit but all over, including California, Florida and Texas.

Needed Inventory?

Maybe it has been taken care of—that is, the question of giving foremen authority commensurate with the responsibilities they must assume. But maybe it hasn't—completely anyway—in view of some statements at recent public meetings. And maybe the authority is there but the boss is unwilling to use it for any of a number of reasons.

The wise delegation and the willing acceptance and wise use of authority are no light matters. For that reason, perhaps, an "authority inventory" might be taken by all concerned at intervals. Top management might ask itself, "Are we giving authority commensurate with responsibility, and are we helping the supervisor use authority wisely and backing him up in that use?" And the foreman might ask himself, "Do I need more authority, or do I have enough if I make better use of it?" Such question-and-answer sessions might go far toward solving some of the problems involved in relations between management and men, and at the same time speed up the attainment of major operating objectives—higher productivity and greater safety, as examples.



TYPICAL CONTINUOUS MINING PLAN at Gorgas, showing development, equipment placement and ventilation.

Ventilation and Dust Control With Continuous Miners

What the problems are

What is being done to meet them

What is needed for future progress

By J. A. HAGY

Manager of Coal Mines, Alabama Power Co., Gorgas, Ala.

EFFECTIVE MINE VENTILATION involves circulating pure air throughout all parts of a mine to dilute and render harmless all dangerous and noxious gases, and also proper direction of the air currents to the working faces or other points with a minimum loss and at the lowest possible cost for power. This is a fundamental mining practice because life cannot be sustained without air. Dust brings in various hazards, and dust quantities have grown as a result of wider use of machines underground.

The effect of rock dust containing

Abstract of a paper presented at the meeting of the Mine Inspectors' Institute of America, Columbus, Ohio, June 4-6.

silica on man was first noted as early as 1649 when stone, largely for building purposes, was quarried and cut in foreign countries. It was probably not known then, but we do know now, that dangerous dust is invisible. It can be in a mist, carried in gas or smoke or fumes and in other media. None of us would knowingly eat contaminated food but we are often indifferent to contaminated atmosphere.

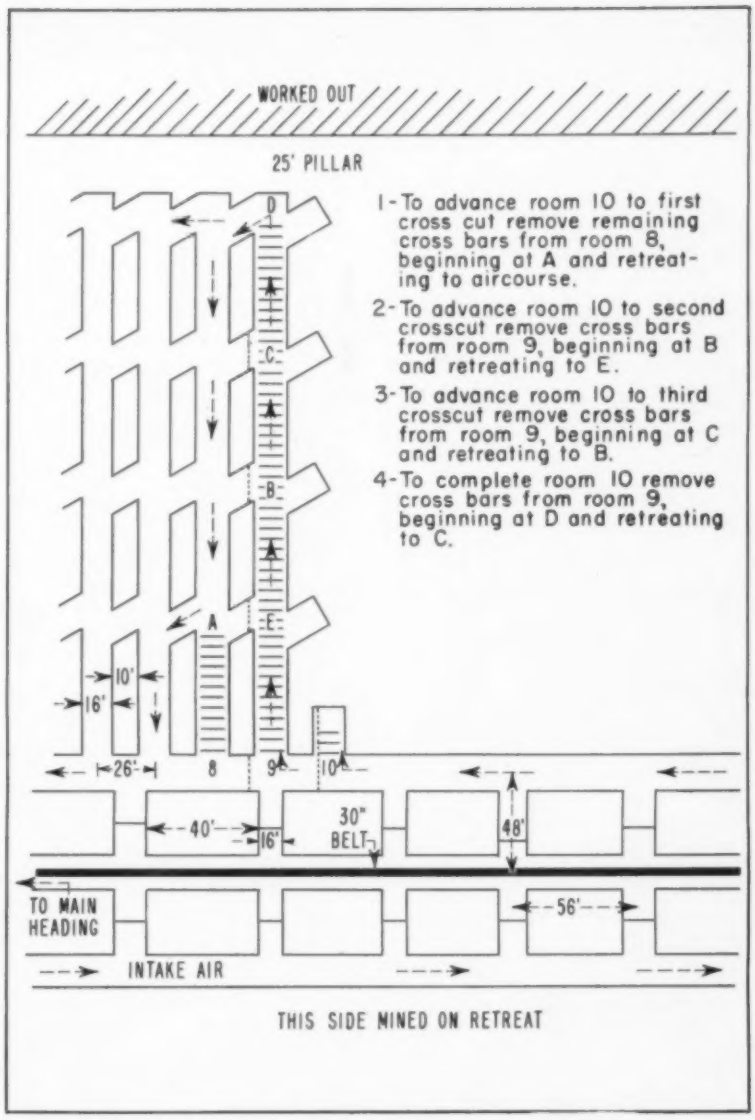
DUST IN ALABAMA

In Alabama, the thinner coal seams are usually free of impurities, but, more or less as a rule, the thick coal beds include various partings of clay, carbonaceous matter and, in some instances, slate. This is especially true of the seams in Walker and Jefferson counties. With so many bands of impurities, much dust containing both coal and the partings is supended in the mine atmosphere during mining operations. This combination of parting dust and coal dust creates a more complicated problem than if the dust were from coal alone.

This dust, usually carried in suspension, should not be confused with rock dust or limestone dust which is commonly observed along belt and track haulageways and which, too, may be carried in suspension. Limestone dust, however, usually contains a minimum amount of silica, less than 5%, under the Bureau of Mines standards.

We are interested in improving dust conditions in our mines and now have a dust control program in effect with our general modernization program. We are trying to keep our dust level as low as possible by better directing the wetting agent to the source of dust formation and by passing the greatest practical amount of air through the suspended dust area so as to have less particles per cubic foot. There are definite plans for future work in monitoring and controlling dust concentrations in the coal mines.

The diagram with this report shows a typical plan for mining with continuous machines at Gorgas. There is a mineable seam above the seam now being worked. Consequently, 30% of the coal is left in place to support the overburden. The mine is classed as gassy by the Alabama Dept. of Mines. Three headings are driven 1,800 ft in each panel and rooms are turned from the two on the outside. The haulage conveyor belt is placed in the middle. Stoppings are built in the crosscuts on each side of the belt. Consequently, the belt entry is ventilated with a neutral split of air. The fresh air enters the working section on the right side and leaves through the heading on the left.



CROSSBAR-ADVANCEMENT CYCLE in continuous-miner development.

All rooms are worked from left to right along each room entry. Each working section is ventilated by a separate split of air.

We have found from experience that we get the best results by regulating the current of air passing through the last crosscut in the place where the miner is operating to 15,000 cfm. More causes discomfort and there is a tendency to pick up dust that we desire to settle. With less, the dust produced is not carried away satisfactorily and more particles per cubic foot result. We try to maintain the desired velocity with a desired volume of air.

We must realize that the courts and compensation boards are not impressed with distinctions between dust with 10% and 40% quartz, especially when the medical experts are reluctant to make definite statements as to comparative significance of such differences. There have been lawsuits involving claims for damages due to dust in bath houses, shops, lamp houses, slate dumps and the like, and others may be expected in the future.

CONTROLLING DUST

After much study, our engineers, scientists, biochemists and others have developed a theory that we can determine standards for keeping the silica and dust contents down to levels we are able to keep the area of open- that will not be harmful to man. When

ings (width of crosscuts, etc.) for air streams constant and the volume of air also fairly constant, we can determine the requirements to properly dilute the dust produced in mining and thus maintain a consistent dust count under some tolerable level.

The continuous miners, the Joy pickup loaders behind the miners and the shuttle cars all have their operating controls on the right side. Therefore, all the operators of these machines are working on the right side, with the exception of the helper, who works on the left side of the place while setting cross collars. Setting collars does not require all his time but while engaged in such work he is in dust, but wears a respirator.

We have the intake air passing over the members of the crew before reaching the face. It sweeps the working face and exhausts through the last crosscut on the left. This plan of ventilation is used throughout the mine and with it we minimize the amount of dust passing over the crew members. Line curtains are installed to a point about 4 ft ahead of the miner operator.

It is my company's aim to do the best job possible to properly control all the dust hazards connected with coal production. Several years ago we started a program. One of the safety inspectors at our mines completed a special course in dust control at the Health Branch of the U. S. Bureau of Mines, Pittsburgh, Pa. While in Pittsburgh he received instruction in dust control, dust-counting techniques and other allied phases of the program we had undertaken. A vacuum cleaner was purchased and equipped for underground duty, a laboratory was fully equipped for running dust samples, and a dust-control engineer was employed, who now works under the direction of Dr. Howard E. Skipper, of the Southern Research Institute. A special study had been made of dust control in all its phases for the past 3 yr.

I am told that the maximum allowable concentration for any single operation is 40,000,000 particles per cubic foot of air. When the dust contains free silica, 5,000,000 particles per cubic foot is considered a maximum allowable concentration. The maximum amount of dust allowable as being not dangerous, averaged over a 24-hr period, is 20,000,000 particles per cubic foot. The maximum peak concentrations for periods up to 30 min is 30,000,000 particles per cubic foot. It is the silica particle size under 5 microns that is considered dangerous. The "Government Gazette," of the State of New South Wales, Sydney, in 1943 stated that "an average not exceeding 20,000,000 particles per cubic foot under 10 microns in size and not exceeding 43,000,000 particles for any one hour should be the maximum standard concentration."

There are two methods of measuring dust concentrations. One is the conventional impingement method which is being used at Gorgas and is the generally accepted procedure for making dust counts. The other is an automatic electronic dust counter which has been built and used by military agencies, and which we expect to use sometime in the future. The silica content in dust is determined by chemical analysis or X-ray refraction methods.

Dust Counts with Various Control Systems

No. of Sprays	Size Spray Nozzles	Water Pressure, PSI	Wetting Agent	Water Volume, GPM	Million Particles per Cubic Foot
5	6	100	No	12	48
6	6	100	Yes	12	38
7	6	400	No	24	23
7	6	400	Yes	24	12
4	5	200	No	14.5	25
7	5	325	No	15	15
8	5	325	Yes	17	15
7	4	325	Yes	10	32
8	0.093	100	No	12	23
7	0.093	200	No	14	25
8	0.093	325	No	17.5	17
7	0.093	325	No	17	23

SPRAY METHODS

We have done much experimental work with water sprays of various types at water pressure from 100 to 400 psi and with many kinds of wetting agents. Water sprays do reduce the total dust concentrations in the place, and especially assist in causing the larger dust particles to settle from the moving air stream, but have little effect on the smaller size dust particles that are of physiological importance. It is very difficult to eliminate small particles (less than 10 microns) from a moving stream by water sprays. Fine dust can best be prevented by not allowing it to become airborne. Thus it must be wetted before being dislodged from its source. It is a difficult problem and our aim is to wet the coal before it is cut.

There are many variable factors involved in dust control—the thickness of the partings in the coal seam, the necessity for taking top or lifting bottom in thin seams, the hardness of the coal, the moisture in the coal section, the air velocity, the volume of air. All these change from day to day. To obtain the best results, these variables should be at a minimum. About all the water-spray combinations have been used. In one instance a dust count of 23,000,000 particles was reduced to 12,000,000 particles per cubic foot when additional water sprays were added and Compound "M" was fed by a Johnson-Marsh proportional automatic flow feeder.

The results from 250 dust samples taken in the last open crosscut outby one continuous miner showed the counts in the accompanying table. Two important facts may be derived from the table. First, as Compound "M" is added the dust count comes down to about 15%. Also, when the amount of water was greatest the dust count dropped in proportion.

BASIC RESEARCH

At Southern Research Institute, Birmingham, Ala., one of the leading scientific research institutions of our country, a dust study has been going for 2 yr under the able leadership of Dr. Howard E. Skipper, assistant director, and Robert E. Galloway, biochemist, as well as Dr. Milton H. Fies, vice president, and D. L. Boggs, dust-control engineer, Alabama Power Co.

The industry needs direct reading instruments for evaluating the health hazards from inhaled dust in coal mines. Such an instrument will not indicate explosive hazards. Many such instruments have been developed for military agencies and one is now being adapted for Alabama Power coal mines by SRI. This instrument, an automatic counter, will give an instantaneous record of dust concentrations directly and will save much labor and time. With such an instrument we expect to greatly improve our record in combatting irresponsible damage suits.

The automatic counter will be especially useful in dust-allaying experiments, since dust counts can be made both before and after any expected change in dust concentration. Results of any experiment can be evaluated on the spot without waiting for laboratory counts, and the next logical ex-

periment can be started without delay. The use of this portable machine will allow us to keep silica and other dust in the air constantly at a level that is not harmful to man. The greatest problem is to determine that level and also determine accurately the maximum concentrations that can be present without harm.

PREVENTING LUNG DAMAGE

Pneumonoconiosis contracted in coal mining is a poorly understood environmental disease which can be prevented by lowering the concentration of dust within the mine to the level which will not cause damage to lung cells. Unfortunately, this level (the maximum tolerated) is not known. There has always been much diversity of opinion as to the basic cause of pneumonoconiosis in soft-coal miners. This leads to the question of whether coal miner's pneumonoconiosis is related to the quantity of dust inhaled over a period of years, the amount of free silica in the dust inhaled, or the chemical constitution of the coal dust. The difficulty in obtaining reliable data on human subjects has contributed to a continuance of the debate.

In 1951, Professor Evans, of the University of Nottingham, England, produced evidence that many low-rank coals contain a prophylactic constituent, "vitricin," which inhibits pneumonoconiosis. Many thought that if this could be confirmed the discovery could well revolutionize our approach to this disease.

In 1953, Alabama Power became very much interested in obtaining data that might substantiate Professor Evans' theory and any information that would help in controlling or preventing pneumonoconiosis in their employees and throughout the mining industry as a whole. If Professor Evans' theory could be proved correct it would mean that pneumonoconiosis is a chemical disease rather than a mechanical one. Alabama Power therefore asked the Southern Research Institute to try to prove and further evaluate the theory.

First the vitricin content of washed Gorgas coal had to be determined. Gorgas coal is a high-volatile type containing a high percent of vitrain. It proved to contain vitricin that could be extracted. Vitricin is a brownish-colored liquid extracted with methanol and contains an antibiotic which will slightly inhibit growth of bacteria.

Equipment was constructed in the laboratory and hundreds of mice were subjected to atmospheres containing high concentrations of cleaned Gorgas coal dust, Gorgas coal dust with vitrain extracted and anthracite coal dust (which does not contain vitrain). The average dust particle size was about 2 microns. These mice were tested at various intervals for the amount of dust in their lungs. Mice were given influenza, pneumonia and tuberculosis but the presence of Gorgas coal dust, regardless of concentrations, did not inhibit in any way the growth of these bacteria. This seems to eliminate the theory that coal containing vitricin releases a substance which inhibits growth of microbial infections in the lungs.

DUST-LEVEL EFFECTS

A second phase of SRI's program called for extensive studies of the effects of high levels of coal dust (instilled or breathed from the air) on the cellular structure of the lungs. The object of this work was to determine the coal-dust level and time required to cause incapacitating damage to lung tissues. It was found after exposing hundreds of mice for as long as a year, making regular checks by pathology, that there was no sign whatever of fibrosis or pneumonoconiosis in the lungs of the mice, regardless of concentrations of dust breathed or the amount inhaled. This leaves the pathologist and biochemists of SRI with a determined fact that regardless of how high a concentration of dust the lung is exposed to, in 1 yr there was no sign of fibrosis of the lung tissues. Therefore, it is seen that a much longer time is needed, perhaps as long as 10 yr, to determine exposure time and concentrations of dust that will be necessary for a lung to show any appreciable fibrosis or pneumonoconiosis.

Southern Research Institute men also believe very strongly that most pneumonoconiosis is a mild case of silicosis resulting from many years' exposure to coal dust containing a small percent free silica rather than the coal dust itself. Should we be able to produce fibrosis from coal dust it will be possible to establish what we call safe working atmospheres and exposures. At present all the figures on this safe atmosphere are only relative.

One question is whether the lung of a mouse responds the same as a human lung. Pathologists can find no difference. In fact, it has been proved at SRI that by exposing a mouse to a high concentration of dust containing a high percentage of free silica the lungs will show a highly advanced stage of silicosis that looks and acts identical with silicosis in a human being.

MORE DATA NEEDED

Since a 1-yr study of coal dust with mice gave no proof of fibrosis, a long-range program is necessary before any definite data can be obtained. The life of a mouse, however, is only about 2 yr, consequently, mice cannot be used for any such long-range program. Therefore, it becomes necessary to use a larger animal with a longer life expectancy and such an animal would be more costly to obtain and keep.

In June, 1954, members of the SRI staff recommended accumulation of data on raw coal dust concentrations in Gorgas Mines over a considerable period while at the same time developing information on the tolerated concentration of Gorgas coal dust. It is known that pneumonoconiosis is a preventable disease. Lowering the concentration of raw coal dust to some now unknown level in a mine would prevent the disease.

Our first step toward collecting data at Gorgas Mine was to take some 100 samples in various locations throughout the mine—embracing all phases of the work and every type of machine. We found that all our samples, with the exception of three, were below the allowable limit. These samples were taken in the area immediately outby the Joy continuous miners, the arc-wall cutting machines, the roof-drilling machines and the Joy loader in conventional mining.

Let me say a few words about the tolerable or allowable limit of dust concentrations as referred to by the Public Health Service which, after running several surveys in the county in 1939, stated that: Employment in an atmosphere containing less than 50 million dust particles per cubic foot would produce a negligible number of cases of anthracosilicosis when the quartz content of the dust was less than 5%.

There are many reasons why we should have dust control. The principal respiratory diseases to which miners are exposed are bronchitis, influenza, pneumonia, pulmonary tuberculosis, anthracosilicosis and silicosis. There are no satisfactory medical answers to this question but we as engineers, inspectors, and good mining men of the know-how type are making a serious mistake if we let men breathe heavy dust concentrations of any material. Such an offense is as serious as knowingly permitting a mine worker to be exposed to any other known hazard.

Efficient dust control will result in improved visibility in the modern coal mine. We have yet a long way to go to overcome the hazards of mine dust to mankind. Most accidents are unexpected, but injury resulting from coal dust can be anticipated.



BUSINESS END of the Truax-Traer wheel excavator is this 24-ft wheel, equipped with nine 1½-yd buckets which are filled at a rate of 54 buckets per minute.



350 FT AWAY from the point of pickup the dirt is discharged, leaving spoil room closer to the coal for material removed by a 33-cu yd shovel.



Wheel

Earth-moving capacity and long reach of wheel excavator extend strip-mine life and eliminate need for rehandling spoil.

THE FIRST PRODUCTION MODEL of a U. S. wheel excavator, originally designed to supplement a 33-yd shovel, now bids fair to "hog the load" from the shovel at stripping operations of Truax-Traer Coal Co., Fiatt, Ill. Like a number of other open-pit coal mines, the Truax-Traer mine is expanding into areas of deeper cover. Handling spoil and finding room to pile it becomes a critical problem.

Top officials at the mine were aware of the need for another stripping machine to work in tandem with the shovel, casting some of the spoil farther out into the spoil area to leave room for the shovel spoil in the open pit close by. The first thought is to secure a high-capacity dragline to get the necessary long reach, but this could result in a need for a third unit to work entirely on rehandling in the spoil area. This would require three crews and three machines to realize the coal-exposing capacity of only two of the machines.

The wheel excavator, it was noted, could be built with the necessary reach to move spoil well beyond the range of the shovel in a single operation, eliminating any possible need for a third unit. Furthermore, the character of the overburden is such that a wheel could dig and load it since there are no inclusions that cannot be loaded and transported on the belt conveyors employed with the wheel.

The big question was whether the proposed unit could operate at a sustained rate that would eliminate any possible interference with the shovel. The pace of the entire mining operation is set by the 33-yd shovel because this is the unit which finally uncovers the coal and delays cannot be tolerated.

WHEEL SPOIL is placed in "windrows" 45 ft apart, making it easier to reclaim the spoil area, as this view from the end of the stacker shows.

Excavator Extends Stripping Range

Based upon these advantages and limitations, an excavator was designed having sufficient capacity to properly serve the shovel, assuming the new unit would be operated 67% of the available operating time. The remaining one-third of the time was set aside for planned maintenance and for making the changes and adjustments that might be indicated in early production runs. Actually, the new excavator quickly fell into step with the shovel, both units operating an average of 75% of the time on a 3-shift schedule.

WHEEL-AND-SHOVEL STRIPPING

The extra operating time found to be available in the wheel excavator permitted an even more desirable distribution of the stripping load. More of the softer top material could be removed by the wheel, thus reducing the amount to be handled by the shovel and resulting in faster advance of the shovel. The wheel strips and spoils an average of 10,000 cu yd of material in a shift, removing 25-30 ft and leaving 30-35 ft for the shovel. The wheel can work the top from an 80-ft highwall down to a 30-ft-high bench.

With the cycle now established, the wheel follows the shovel, taking the top from the next cut while the shovel removes the lower overburden from the current cut, as shown in the accompanying diagram. Cuts taken by both units are 45 ft wide, but the wheel-excavator cut is offset from 10 to 15 ft from the shovel cut to provide a bench that will prevent spillage of the softer top material onto the uncovered coal where the shovel would have to rehandle it.

The narrow bench left by the wheel provides an added advantage since the shovel can work to an almost-vertical face on the lower bench, instead of having to shape a sloping highwall to prevent such sloughing of the softer top material.

The short 40-ft advances make it possible to keep the peaks of the spoil piles closer together for easier leveling of the spoil area. However, the stripping units work far enough in advance of the loading shovel to keep 90 ft of coal uncovered. This allows ample passing room on the top of the seam for the two big units. The loading shovel also makes a 45-ft-wide cut, leaving the remaining 45 ft near the highwall to serve as a haulage road on coal.

HAULING THE COAL

The top of the seam is cleaned by a Caterpillar D-6 bulldozer which has been converted to rubber-tired operation. The crawler tracks have been replaced by wheels of the type used on the haulage trucks. The result is a fast, heavy-duty coal cleaner, combining advantages of high maneuverability with least damage to the sur-

Design Features of the New Excavator

CONVEYOR ROLLERS — In the loading zone of the ladder conveyor, where the belt receives dirt from the wheel over a slope sheet, the rollers are 12 in in diameter, including a 3-in thick covering of shock-absorbing rubber. The inclined side rollers are aligned opposite each other and the center rollers are set in between the side rollers. Center and side rollers are installed on 14-in centers, thus leaving a space of only 1 in between rollers. Rollers outside the loading zone on the ladder are 7-in dia., plain steel. Rubber-covered 12-in rollers support the stacker belt throughout the 35-ft-long loading zone where dirt is received from the ladder belt. The long loading zone is required to accommodate the crowd and retract motions of the wheel-and-ladder assembly. Outside this loading zone the stacker conveyor also is equipped with 7-in plain steel rollers, on 18-in centers in the intermediate portion of the conveyor and 24-in centers at the outer end of the stacker.

WHEEL BEATERS — Provisions for applying heat to the wheel buckets during cold or wet weather include (1) a compressed-air-fed, gun-type oil burner mounted on the digging ladder to direct a flame at the buckets from a distance of 6 ft and (2) a 1,500-w Calrod heater in each bucket. Rotating wipers also assist in keeping the slope sheet clean with the aid of 8-kw heaters under the sheet and banded around the loading zone.

AUXILIARY CRANES, HOISTS, WINCHES—Unit replacement of equipment on the excavator is made easier through the use of two 4-ton traveling cranes overhead in the revolving frame, a similar crane over the stacker-conveyor drive, a 5-ton swinging derrick with live boom mounted on top of the digging gantry ladder and a two-drum auxiliary winch mounted in the superstructure.

COUNTERWEIGHT — There is no conventional counterweight to compare with the 285 tons of ballast required on the 950B shovel. The long stacker assembly serves this function in the wheel excavator.

INTERCHANGEABILITY — Traction crawlers with their hydraulic jacks and motors are interchangeable with those of the 950B, although the piping arrangement to the jacks is designed exclusively for the wheel to permit faster leveling while the machine is in propel. The base has the same dimensions as the 950B, although the girders are somewhat heavier. The revolving frame is designed especially for wheel excavator service.

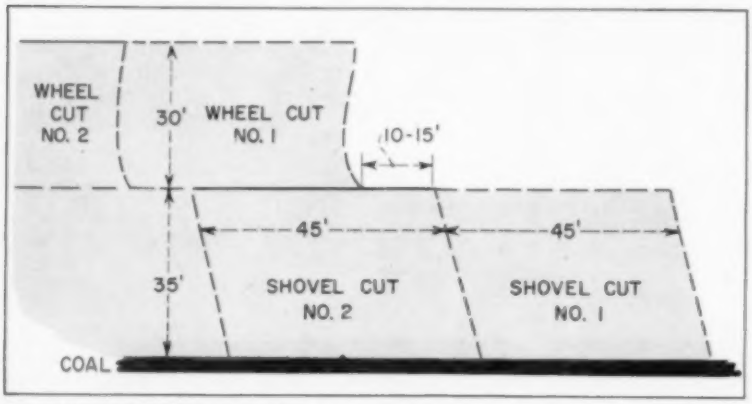
BUCKET DESIGN — Flexible chain bottoms in the buckets assist in discharging dirt. Buckets are attached to the wheel by means of two pins and two bolts, simplifying the job of replacing them. Thus down time is kept to a minimum, and the damaged or worn buckets may be taken to the shop where highest quality repairs may be made.

OPERATOR'S STATION — Master operating controls are centered in a cab which is built into the superstructure 60 ft above the ground. Generator control contactors and resistors are one floor below the operator's cab. From this vantage point, the operator has a clear view of the wheel and the discharge from the stacker conveyor.

CONTROLLED PROPEL — The propelling motion can be engaged in only two positions of the machine—one when the conveyors are parallel to direction of travel and the other when the conveyors are at right angles to the direction of travel. This insures stability and proper distribution of the load on the crawlers while traveling. Limit switches prevent motion of the crawlers when the conveyors are in any other position.



CHAIN BOTTOMS in wheel buckets insure full ejection of dirt. The operator, in his cab 60 ft above the ground, has a full view of wheel and stacker.



CUT SEQUENCE for 33-cu yd shovel followed by wheel excavator.

Specifications of the Truax-Traer Wheel Excavator

PHYSICAL DIMENSIONS:

Working weight, tons	1,250
Maximum height (top of stacker gantry), ft.	140
Minimum digging height, ft.	29
Maximum digging height, ft.	80
Maximum spoiling reach, ft.	350
Height of stacker, ft.	112

POWER EQUIPMENT:

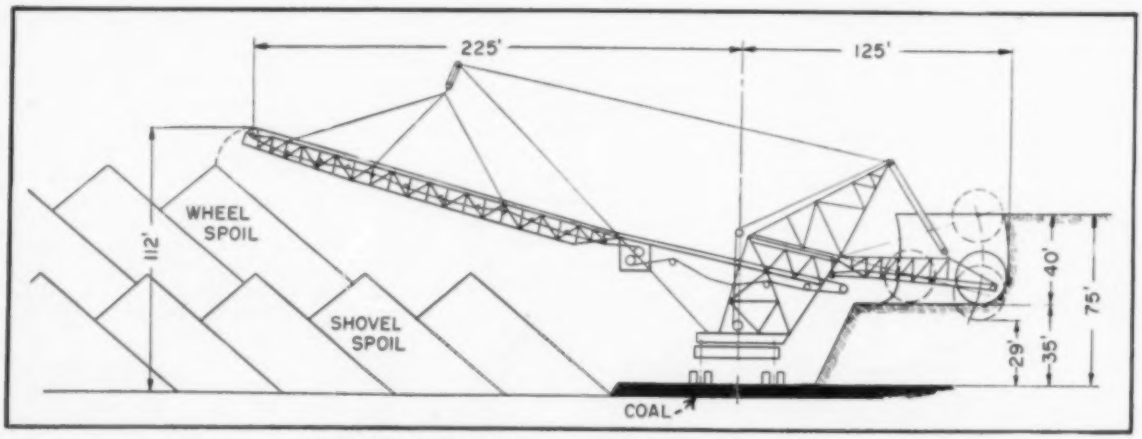
Main m-g set drives (AC), hp.	2 at 800 ea
Wheel drive (DC), hp.	187½
Ladder-belt drive (DC), hp.	187½
Stacker-belt drive (DC), hp.	2 at 187½ ea
Ladder-hoist drive (DC), hp.	150
Crowd of wheel (AC), hp.	100
Stacker-boom hoist (AC), hp.	40
Crawler drives (AC), hp.	4 at 75 ea
Swing drives (DC), hp.	2 at 25 ea
Auxiliary drives (lubrication, ventilation, etc.), hp.	75

WHEEL DATA:

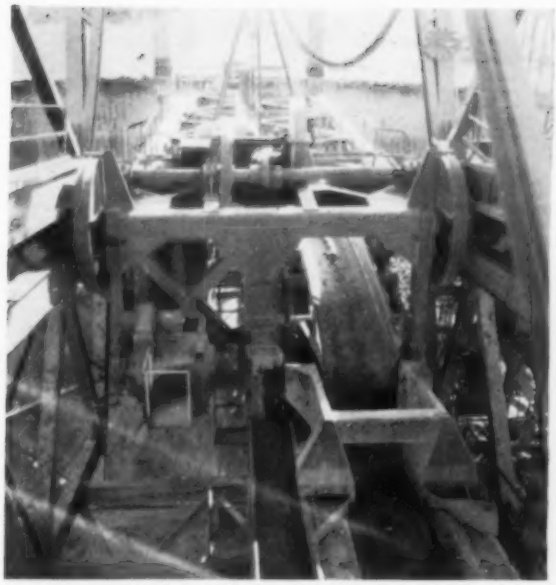
Wheel diameter, ft.	24
Number of buckets	9
Capacity each bucket, cu. yd.	1⅛
Wheel speed, rpm.	5¾ to 8
Digging force at bucket lip, lb.	47,000
Maximum side digging force (swing), lb.	30,000
Normal swing, rpm	0.10 to 0.16

CONVEYOR FEATURES:

Ladder conveyor	
Width of belt, in.	54
Length of ladder, ft.	70
Belt speed, fpm	1,000
Stacker conveyor	
Width of belt, in.	54
Length of conveyor, ft.	285
Belt speed, fpm	1,250



WORKING RANGE OF Truax-Traer's stripping machine.



DIRT REMOVED BY WHEEL is transferred from ladder conveyor to stacker conveyor in long loading zone.



COAL IS BROKEN prior to loading by two men using this drill-and-explosives carriage ahead of the shovel.



BOOSTERS of wheel stripping are Bryon Somers (left), superintendent, and Gene Long, assistant superintendent.



SWITCHHOUSES for each stripping unit contain oil switch, ground-fault protection and safety interlocks.

Good management, efficient servicing keep down-time at a minimum

face of the seam, which could result in a loss of good coal.

After the coal is cleaned, the 100B loading shovel, equipped with a 7-yd bucket, loads from the 4½-ft Illinois No. 5 seam into the haulage trucks. The haulage fleet consists of 13 33-yd bottom-dump Euclid trucks and six Caterpillar DW20 tractors hauling 56-yd Athey PH20 bottom-dump coal haulers. An average of 150 haulage units are loaded in the 7¼-hr loading shift.

The new DW20's haul about 4,200 tons of raw coal per shift 3½ mi from the pit to the cleaning-plant hopper. Round trips, dump to dump, are made in less than 24 min by these haulers. Average loading time at the 100B is 2 min 40 sec and delays at the shovel and hopper add another 2 min 35 sec to the cycle. Tractors for the coal haulers are powered by 300-hp turbo-supercharged diesel engines, and are capable of hauling the 45-ton loads at 32 mph on level road and returning empty at 40 mph.

SUPPLYING PIT POWER

Power from the utility transmission lines, at a potential of 33 kv, is stepped down to 4,160 v for distribution on pole lines to the three pits comprising Fiatt mine. Final distribution from the ends of the pole lines is made through rubber-covered, shielded trailing cables (Type SH-D) employing three 2/0 conductors and three No. 5 ground wires equivalent to one 2/0 conductor.

Ground-fault protection is provided by a grounded-neutral system, each electrified unit in the pits having its own protective circuit thus isolating a possible fault to the single unit affected. The switchhouse in the pit for each major unit is equipped with a cable plug-in, oil switch, overload relay and ground-fault protective auxiliaries. Frames of the switchhouses are tied into the grounding circuits.

Each switchhouse also is equipped with a positive isolator which makes it impossible to open the door of the



7-CU YD SHOVEL loads from 4½-ft seam into haulers



45-TON HAULERS travel at 32 mph on level road.



WATER WAGONS for sprinkling roads are converted haulage trucks, keeping dust allayed for better visibility.



FASTER STRIPPING results from application of wheel. Note bulldozer converted to rubber tires for cleaning coal.

Faster stripping demands dependable loading and haulage methods

switchhouse unless the oil switch is disconnected. The positive isolator provides a visible signal of the open or closed position of the oil switch. The isolator cannot be opened under load, but it does open through the action of a solenoid armature which drops when the oil switch opens. The door of the switchhouse is mechanically interlocked with the isolator. This system provides maximum protection for maintenance men.

Heart of the wheel excavator's power system is a pair of m-g sets each driven by a General Electric 800-hp, 4,160-v synchronous motor. These main sets are installed at opposite ends of the revolving frame, thus counterbalancing each other. One of the sets includes a 300-kw ladder-conveyor generator, a 300-kw wheel generator, a 45-kw swing generator and a 40-kw exciter to provide variable voltage, DC, for the motors. The other set provides power for the two stack-conveyor motors and the ladder-hoist motor.

All motors are of the 600 series DC mill type and are controlled through Ward-Leonard systems, providing variable-speed control of the excavator motions, the wheel and the conveyors.

The wheel excavator operates three shifts per day, digging from the highwall and discharging into the spoil area about 10,000 cu yd per shift. The wheel and the 950B expose about 4,000 tons of coal per day for recovery on the single loading shift.

The mine employs 220 men in the three pits and the cleaning plant, and nine more men at a loading dock on the Illinois River where approximately 1,300,000 tons of coal per year is loaded into barges. Byron Somers is superintendent, and Gene Long is assistant superintendent. Both officials were actively concerned in the conception and subsequent design of the excavator. R. M. Leseney is mechanical superintendent. Elmer McCann is master mechanic; Floyd M. Cordray is chief electrician, Carl Bowlin pit boss.



AVERAGE PRODUCTIVITY of 20 tons per man shift in 46-in coal results from the application of shaking conveyors equipped with power-driven self-loading heads. Crew consists of 10 men and a foreman (three units per section).

Self-Loading Conveyors Increase Mining Efficiency

Shaking conveyors with power-driven loading heads and improved coal-breaking with compressed air lead to increased productivity. Effective roof control improves safety at Morrisdale Coal Mining Co.

By J. W. HUNT, Associate Professor, and
M. E. ALTIMUS JR, Assistant Professor
Mineral Industries Extension Services
Pennsylvania State University, University Park, Pa.

THE MAXTON NO. 1 SLOPE MINE is an integral part of a three-mine producing system developed by the Morrisdale Coal Mining Co. in Clearfield County, Pa. A central cleaning plant, located near the entrance to the mine two miles north of Philipsburg, Pa., prepares 1,600 tons per day of clean, sized coal from two underground mines and from stripping operations, for shipping via the New York Central R. R.

Coal is mined from the Lower Kittanning or "B" seam which lies 160 ft below the surface at the slope. First opened in 1940, the mine was designed for hand loading onto shaking conveyors, rail transportation to the slope bottom, and belt transportation to the surface. Later additions of power-duckbill loading heads and butt-heading belts have provided high production, extreme flexibility, and improved safety which has featured the operation in spite of very difficult mining conditions. Nine hundred fifty tons per day are produced by 89 employees on the two working shifts.

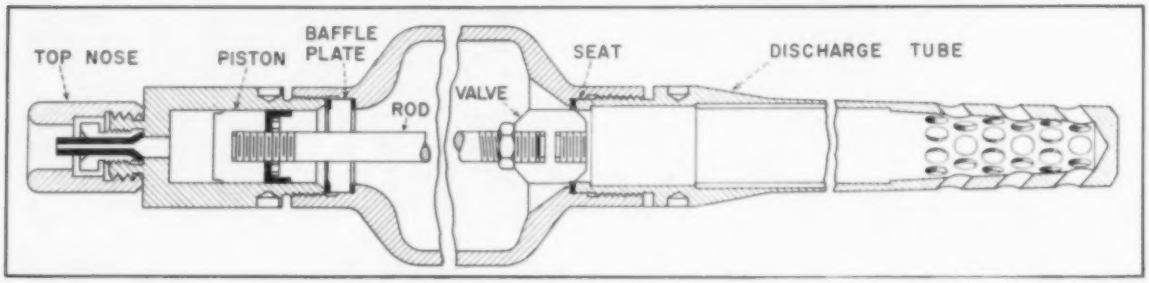
SEAM DESCRIPTION

The Lower Kittanning or "B" seam, part of the Allegheny formation which also contains six other mineable seams, is the most persistent bed in the formation. It ranges from 15 to 84 in thick with bands of slate, clay, and boney separating the coal into benches. At Maxton, the coal averages 46 in in thickness with a binder of boney from 2 to 14 in thick about 2 ft from the bottom of the bed. Below the coal is a 16- to 18-in bed of hard fire clay which provides a good bottom if not disturbed. The immediate roof consists of a layer of slate approximately 4 in thick, above which is found a laminated sandy shale overlain with sandstone. With proper timbering little difficulty is encountered in holding the roof.

Faults, of the displacement type,



IMPROVED AIR-BREAKING SHELL, shown in cross-section in the diagram below, includes large-diameter air receiver at back of shell to simplify coal-breaking operation. Steel ⅝-in airline underground serves as air reservoir.



are common throughout the mine. The displacement generally varies from a few inches to 2 ft, although in one area a displacement of 10 ft has been encountered. These faults have required the alteration of the mining plan in many areas.

The presence of ground water in large quantities has made proper drainage and pumping a major problem throughout the life of the mine.

MINING PLAN

The mining plan was devised after correlating information from diamond drilling, adjacent mines and from exploratory entries driven from adjoining mines. To reach the coal 160 ft below the surface a 6x18 ft slope 450 ft long was driven from the surface at an angle of 18 deg on an easterly course. Two compartments were provided, one for the installation of a 36-in belt conveyor for transporting the coal and the other for installation of track for hauling equipment and supplies. Steps were provided in the belt compartment for inspection and as a manway.

At the bottom of the slope a heading was driven as a four entry system to a point 400 ft distant where South Mains were turned off at right angles to the north as a six-entry system. Fifty feet to the south in the No. 5 heading of South Mains, the main ventilating shaft was sunk from the surface. This two-compartment shaft, 150 ft deep, has provided ventilation for the life of the mine.

As South Main was advanced the first indication of the difficult mining ahead was evidenced when faulty conditions were encountered. One of the many variations which would be found necessary was made when only two headings were driven the full 800 ft to the point where the East and West Mains were to be turned off at right angles.

At this point East Main was developed as a four-entry system, each entry being 18 ft wide on 50-ft centers. Two butt entries were turned off to the left at right angles to the Mains 20 ft wide on 60-ft centers at 375-ft intervals along the main heading. Rooms 300 ft long and 35 ft wide were developed on one side of the butts. The distance between the third and fourth butt heading was increased to 1,300 ft and 300 ft rooms developed from line rooms which had been driven on 700-ft centers between the butts. At this point East Main was stopped because of faulty conditions which also prevented the full development of the south section of East Mains. North Mains were also ex-

tended and developed for a distance of 1,500 ft with rooms developed at right angles on both sides.

To avoid driving through the faulted area encountered in South Mains, a two-entry cut-off was driven at an angle of 45 deg to the left to the intersection of the projected West Mains. (Later the No. 3 entry of West Mains was cut through the fault.) This was developed in a similar manner to the East Mains with butt headings being turned at right angles to the north. Four headings were started but only one was fully developed because of faulty conditions. West Mains were driven a total distance of 5,500 ft but the development to the north was abandoned because the two sections of coal were separated by 6 to 7 ft of rock, thus leaving only the lower bench of 22-in coal to be mined.

The southwest section was developed by driving 2 and 3 South as a four-entry system to the property line and turning butts off at right angles on a three-entry system with room development as previously described.

A four-entry slant heading was turned off 2 South parallel to the property line to permit mining the coal to the barrier pillar line to the south and west.

The area to the south and east where present mining is being carried on was held in reserve because it was underneath a swamp area beyond the Moshannon Creek. The extension of the South Mains beyond the shaft area was driven from 1 Left off 2 South and extended to the intersection of 2 Left. At this point the heading was turned 15 deg to the left and continued for a distance of 900 ft. Here it was turned an additional 33 deg left and will be continued on a course 552 deg 59 min E to the property line, a distance of 1,350 ft.

In the South Mains area, 400 ft south of the first turn, a butt heading was turned to the left as a three entry system and driven at an angle of 115 deg for a projected distance of 1,200 ft with rooms 35 ft wide on 50-ft centers turned on both sides. This area is now being worked by hand loading on to shaker conveyors. A similar set of entries will be driven 800 ft inby for development by the same method.

At a point 300 ft inby the curve a butt entry is being turned to the left on a N 79 deg 55 min E course. Rooms will be turned at right angles following the general plan of upper entries. A similar butt entry 700 ft distant will enable the mining of coal to the property line.

The right side is being developed in a similar manner by driving, at the present time the first butt heading on the right on a S 38 deg 55 min W course. At the time of the mine visit the entry had been developed for a distance of 550 ft and the first seven rooms driven to the 300-ft limit. This and the second butt heading to the right will be driven a distance of 1,600 ft to the barrier pillar line of an adjacent mine. Rooms to the left side of the second butt entry will remove the coal to the barrier pillar in that direction. This area will, at the present rate of production, provide coal for a four to five year period, thus exhausting the mine.



SIX-STAGE COMPRESSOR, installed on the surface, provides air at 8,500 psi through borehole for breaking coal at the face.



KERF is made 6½ ft deep by shortwall cutting machine immediately below boney near center of seam. Note strict adherence to timbering plan.

HOW COAL IS MINED

Coal is produced from three working sections, one using hand loading on to shaker conveyors and the other two using power-duckbill equipped shakers. The power duckbill sections use Goodman 712 top cutters with a



MAP OF MORRISDALE WORKINGS shows different methods employed and location of major service facilities.

7-ft bar, Chicago Pneumatic hand held electric drills, and the shaker conveyor power-duckbill loading heads. The drills use Hardsoeg carbide-tipped bits while the cutting machines use standard bits that can be re-sharpened.

Each producing section contains three working units, one on development and two on rooms. The section crew consists of ten men under the direct supervision of a certified mine foreman. The crew is made up of a cutter, duck operator, and a duck helper who drills timbers and cleans up, for each unit and in addition a boom man for the entire section. The average production per face man is 20 tpd.

Three power duckbills are used for the development of the four entries of the main entry system. Track is carried in the number 1 heading and through crosscuts to the other three entries. The shaking conveyors discharge directly into the mine cars. Top rock is taken down to provide headroom in the track heading and at the loading points in the number two heading.

Butt entries are driven 1,600 ft long on 750-ft centers, 20 ft wide in triplets with crosscuts on 50-ft centers. The heading is driven 300 ft by the duckbills and the belt installed in the center heading. At this time the first room is turned off at the first crosscut and driven for a distance of 300 ft. Rooms are driven on 50-ft centers 35 ft wide leaving a 15-ft pillar which is not recovered. The rooms are worked on a half advance-half retreat system, with the initial driving being done on the right or left as conditions warrant.

Moving up units is generally planned for the non-productive shift and is completed by four men in a single shift. Two or three cuts are loaded by hand before the power-duckbill head is installed. The shakers discharge directly on to the butt belt.

The moving of a butt belt from one section to another requires two shifts. These belts are four-ply Hamilton or U. S. Rubber belts 36 in wide. They are operated at a speed of 180 fpm. The belt drives are Jeffrey with DeLaval speed reducers and are powered by 550-v, 25-hp Westinghouse motors.

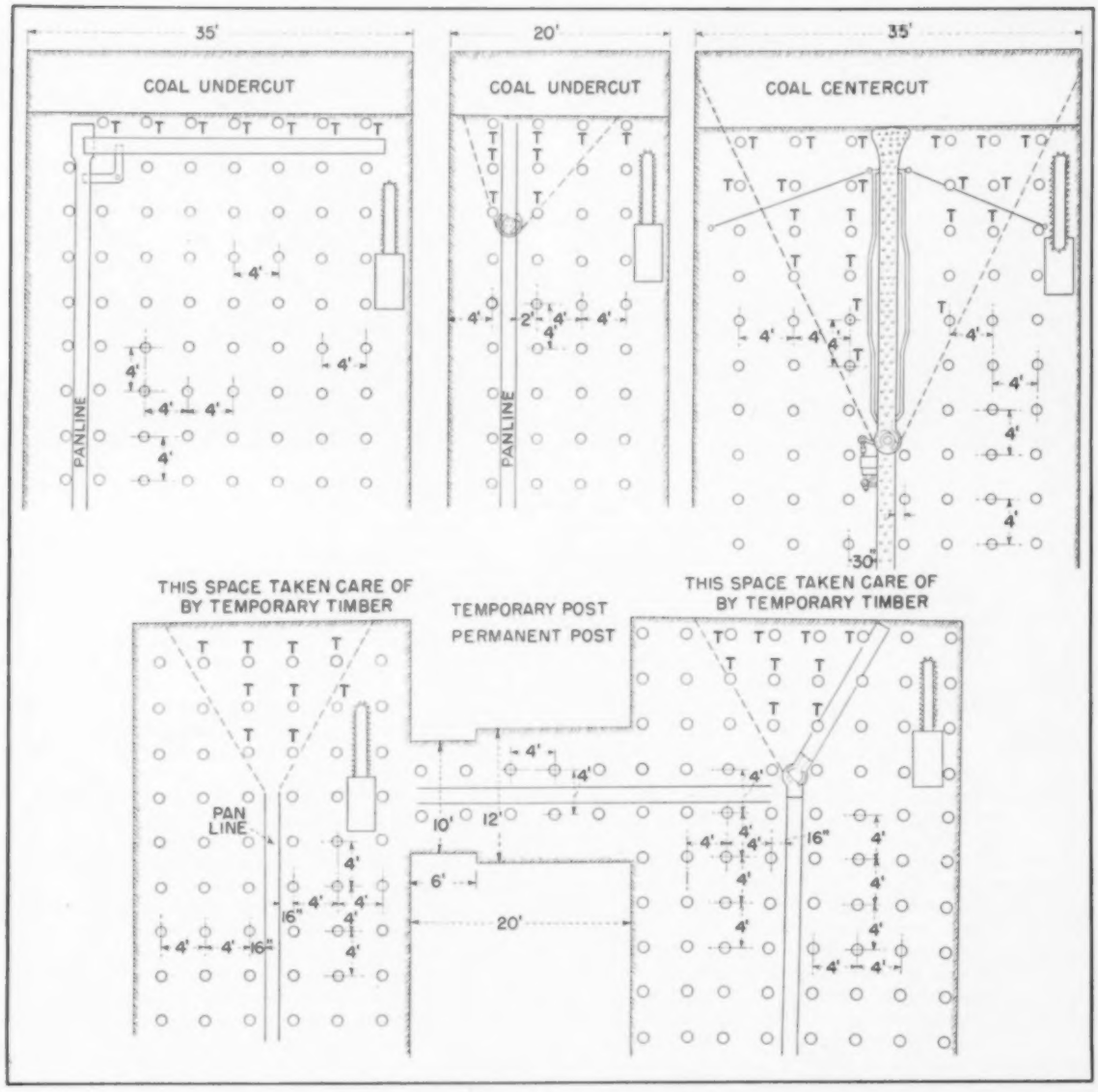
The belt discharges into mine cars on the main heading. The cars are spotted at the boom by a Thomas Electric Co. car spotter using a 10-hp Westinghouse motor. Fire extinguishers are maintained at the boom and at the loading points along the belt.

OPERATING CYCLE

The shaking conveyor is located in the center of the 35-ft room and the extended power-duckbill head is able to swing right and left to either rib. The duck-bills are equipped with DC motor-driven double-drum rope hoists specially mounted on a frame. Wire ropes from the drum over front end sheaves are anchored by pipe jacks near the ribs of the working place. The machine, push-button controlled, is moved from side to side by the rope action.

A 6½-ft kerf is cut in the coal just below the binder, across the entire face starting from the right rib. The cutting machine is able to pass the retracted duckbill readily and the 35-ft place is cut in 45 min. When the cut is finished, the cutting machine is withdrawn from the face at the left side to avoid interference with the drilling operations.

After the cutter moves from the right rib the driller follows, drilling 2-in holes in both the top and bottom bench with a hand held electric drill. The holes are started one foot from the roof and floor and angled to hit the roof and bottom respectively at the back of the cut. Seven or eight holes are evenly spaced in each bench,



ROOF-SUPPORT PLAN requires posts on 4-ft centers, leading to a good safety record.

each hole taking about 2¼ min to drill.

Loading, cutting, and drilling apparatus is withdrawn a safe distance from the face and the coal is broken by the Airdox method, starting in the center and firing top and bottom holes in succession, first to the right and then to the left.

Loading is started at the right after the cutting machine has been moved to the right rib back from the face. As the loading progresses toward the left, first the cutting and then the drilling operations are followed as previously described. Temporary and permanent timbering plans are carefully followed as described in another section of this article. Butt entries are developed in a similar manner using one power duckbill unit to drive the three headings.

VENTILATION

The mine is ventilated on an exhaust system through the 150-ft, two-compartment shaft previously described. The downcast and upcast are separated by a curtain wall with a stairway located in the downcast compartment. Ventilation pressure is maintained by a 3x6-ft Jeffrey Centrifugal fan which supplies 51,300 cfm to two active splits, 12,000 cfm to the hand loading sections and 15,000 cfm to the power duckbill section, the remaining air being used to ventilate inactive sections.

Stoppings are built of concrete blocks with brattice cloth being used for curtains and checks. Box regulators at the end of the splits provide proper regulation.

ROOF CONTROL FOR SAFETY

At the present time roof control is not an apparent problem. While the roof conditions seemed better than one generally finds, the officials maintain a stringent and persistent roof control program. They emphatically stress the necessity of making frequent roof soundings and inspections and require continuous conformity to the proposed systematic timbering plan.

The timberman must constantly install and remove temporary posts, in



BUTT-ENTRY TRANSPORTATION is provided by 36-in belts which discharge into cars. Top rock is taken down for headroom.



MINE CARS are hauled to foot of slope by 10-ton locomotives. From here the coal is dumped into slope-belt feed hopper.

order to provide protection for the equipment operators and at the same time allow the various operating units to function without unnecessary stops to remove posts previously set.

The plan requires the placing of props on 4-ft centers across the width of the place as well as in the direction of the face. Temporary timbers are set in the areas through which the duckbill and cutting machine must move to load or cut coal. In fact, while visiting the working areas a prop was set the moment a 4-ft opening was cleared. The only variations in the plan were made to provide additional protection. Specific details followed in setting props include such items as:

1. All props are set on solid bottom.
2. Capblocks are set parallel to panline and at right angles to any crack or crevice.
3. Crossbars are set where necessary.
4. Wedge capblocks or wedges are used on top of all posts.
5. Safety props must be set until permanent timbers are installed under loose roof.
6. Men taking down loose roof must use a bar and keep themselves under solid top or protected with safety posts.
7. Feeling for roof vibrations when sounding is a must.
8. Broken timbers are replaced as soon as possible.

In addition to the well carried out timbering plan, other safety measures such as removal of loose roof, replacement of broken timber, spragging cuts, constant observance of the rib and face conditions, and reports made on all roof conditions and movement are required duties of every member of the production team.

Proof that strict adherence and conformity to the timbering plan is in the company's safety record. It was learned that since the plan was put into effect 10 yr ago there has not been a major lost-time accident nor a fatality.

COAL-BREAKING EQUIPMENT

Because of the market demands and seam characteristics the Morrisdale Coal Mining officials settled on the Airdox coal-breaking equipment. A single six-stage compressor is located near the exhaust fan. The Airdox compressor is driven through V-belts by a 50-hp, 440-v AC motor and is regulated by a system of bourdon tubes operating micro-switches connected in the motor circuit. The AC motor is automatically stopped when the air pressure reaches 8,500 psi and starts when the pressure drops to 8,200 psi.

The Airdox compressor is an 8-cylinder, horizontally-opposed, air-cooled type which compresses the air in six steps as follows: 0 to 30 psi, 30 to 120, 120 to 360, 360 to 1,200, 1,200 to 3,600, and finally 3,600 to an adjustable value, in this case, 8,500 psig. The air is passed through a baffle type trap located between each stage to eliminate the entrained moisture and oil. Heat caused by air compression is liberated in an intercooler coil placed between each stage.

A 1-in O.D. x ⅝-in I.D. steel line conducts the air under these pressures down a borehole to within 150 ft of the face. Copper tubing carries the air from the blowdown valve to the receiver tube. The steel line which holds approximately 2.5 cu ft of air for every 100 ft of length at atmospheric pressure will serve as a reservoir for approximately 575 such columns of air at 8,500 psig. This reservoir relieves the necessity for continuous compressor operation. Valves are placed in the steel line at certain intervals to overcome the necessity of draining the entire line while conducting maintenance operations.

The use of the receiver tube, shown in an accompanying illustration, requires only that the shotfirer place it in the hole and attach the copper tubing to the top nose section. The shell consists mainly of the receiver body which remains outside the hole and the 6-ft discharge tube which is inserted into the hole.

After the shotfirer completes the face preparation, he positions himself at the blowdown valve. The firing warnings are given and the blowdown valve is opened to the receiver tube shortly thereafter. The air enters the top nose and subjects the piston to the high pressure. This forces piston and rod to the position shown in the drawing, with the valve against the seat. The air also passes around the leather packing on the piston through a small orifice in the baffle plate into the receiver compartment. A pressure gage located at the blowdown valve indicates whenever the pressure in the compartment has been equalized to the system's pressure. The blowdown valve is closed at this time.

At this point the breaking charge is in the shell and has not been released. The shotfirer then delivers another warning and opens a set screw on the blowdown valve. When the screw is opened the air pressure in the line between the piston and the blowdown valve is released. The reduction in pressure in this portion of the shell allows the pressure in the receiver to force the piston to the

left opening the valve to the discharge tube. The compressed air then escapes into the discharge tube and out through the 45-deg holes in its nose, breaking the coal from the seam.

The entire shooting procedure requires approximately 1 min for every shot fired. The convenience of the receiver tube is its simplicity in shooting numerous holes in a face. The shell must only be installed in the drillhole with the necessary protection to prevent a flying shell.

HAULAGE SYSTEM

The haulage system subjects the coal to a unique combination of transportation equipment. The coal travels from the shaker conveyor to butt belt conveyor. At the belt head it is discharged into 3-ton end dump mine cars for the trip to the slope bottom, a distance of 2,200 feet. It is at this point that the coal is directed onto the slope belt conveyor.

Rail haulage is handled by two 10-ton locomotives, each of which is used for gathering and main haulage duties. Storage space is provided in the main heading for additional empties and loads to assure continuous loading as much as possible. A third locomotive may be used to handle the supplies, although supplies are delivered on each of the two operating shifts.

Rail is laid on 4x6-in treated ties with the average mine material for ballast. While the traveling conditions require light and slow speed rail haulage, it is adequate. Essentially, the restricting factor stems from the water problem at this mine. Many sections of the roof along the haulage way must be lined with sheet metal to direct water pouring from crevices to the rib section. Although the amount of water is excessive, natural drainage to sumps located along the main haulage sections and in major pumping sections keep the track water-free.

A single crossover dump tilts the cars and the coal runs by gravity into a 10-ton feeder bin. The coal falls from the bin onto a 20-ft belt feeder conveyor. The feeder belt conveyor is employed to control the loading of the main slope belt which inclines at an angle of approximately 20 deg.

While the primary purpose of the feeder conveyor is to control the discharge from the bin to the 36-in main belt, it has proven useful in providing a means of preventing spillage at the two additional loading points near the surface. The two additional feeders are used to conduct strip coal and coal mined at the company's Maxton No. 3 mine onto the main slope belt which conducts the coal into preparation.

The strip coal is trucked to the surface bin which discharges through a Syntron vibrating feeder onto the main belt. The vibrating feeder is located approximately 10 ft below the surface over the main belt.

The coal from the second deep mine operation is shipped by railroad to the Maxton No. 1 plant. The railroad car is unloaded into a storage bin with the aid of a Robbins car vibrator. Since this dumping point is approximately 100 ft from the centerline of the main belt a belt conveyor is employed to carry the coal from the bin to the main belt. The discharge onto the main belt is approximately 60 ft below the surface. The speed of each belt type feeder can be controlled in order to relieve any tendency to overload the main belt. The company economizes by using 36-in belt throughout its operations. Portions of the belt removed from the main slope belt conveyor are used to replace worn out sections of the small feeder conveyors.

PREPARATION

Preparation actually begins at the mine face. The largest preparation problem confronting the company is maintaining a low ash content since the seam contains a boney and slate binder. The face preparation and shooting with Airdox, as previously described, permit the face crews to gob a large portion of this binder which is broken from the face in large lumps.

Coal analyses show that the fine coal produced in mining operations contains only a small amount of the ash content of the seam. The ash problem thus stems from the larger sizes of coal. Consequently, the ⅜x0 coal is screened out and conveyed to the rail car without special cleaning.

The coal above 5 in is crushed and combined with the previously screened ⅜x5-in coal and passed through a Baum type jig. Approximately 50% of the coal entering the preparation plant is cleaned in this manner. Clean coal rejoins the ⅜x0 at the loading point. The company is quite capable of maintaining a shipped product with an ash content of 8.5%; sulfur, 1.8%, and with a dry Btu value over 14,000. The wet mining conditions coupled with hydrotator cleaning does present a moisture problem although moisture content is generally within the 6 to 15% range. The company does attempt to keep the run of mine coal shipped within these specifications. Since the strip coal entering the preparation plant is from a full-seam operation, the preparation foreman can control the ash to some extent by varying the amount of strip entering the plant at any one time. An average of 300 tpd of strip coal is blended with the Maxton Slope coal.

POWER SYSTEM

The Pennsylvania Electric Co. supplies the mining plant with 2,200-v AC from which the required electrical energy is tapped. The transmission lines from the supply bank of transformers were constructed by the mining company. AC lines transmit the 2,200-v power to four separate banks of stepdown transformers which reduce the high voltage to 440 v, AC. Two banks are located on opposite sides of the property to handle the pumping loads in these areas. The remaining transformer units located near the portal handle the preparation plant, compressor, and conversion equipment.

Three Ridgway 200-kw m-g sets are employed to convert the 440-v AC to 550-v DC. Each generator is driven by a 300-hp synchronous motor. While the three sets are housed in the same building only two sets are operated at any one time to handle the mine load. A mean load between 400 and 600 amp is normal for the inside operations. A 500,000 cm cable conducts the power down the borehole but the mine feeder consists solely of the 4/0 trolley wire. Two-conductor 2/0 insulated cable, and a bare 4/0 negative ground line conduct the electrical current to and from the face equipment. Bonded and cross-bonded 40-lb rail is used as a return in the main and butt headings. Each positive line is tapped from the trolley wire in the butt entries through a 100-amp fuse. However, power take-offs from the 712 Goodman shortwall cutters supply the power to operate electric drills.

Four 440-v, 3 phase AC electric motors are used to drive pumps discharging a total of 8,000 gpm at a head of 165 ft during each working shift. This represents approximately 30 tons of water pumped per ton of coal produced. A pumper is employed on each shift to maintain and control the pumps as the water load varies with the atmospheric conditions.

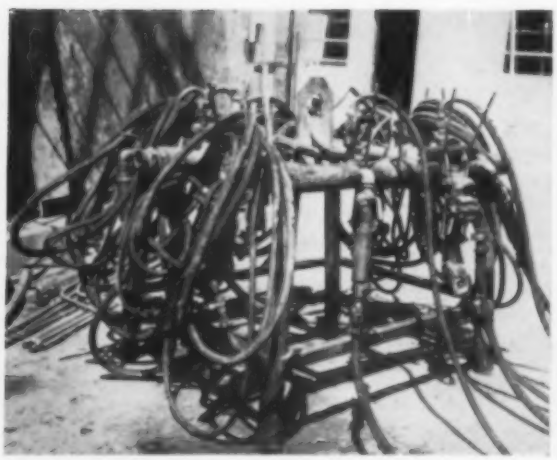
MANAGEMENT

The entire operation of the Morrisdale Coal Mining Company is under the supervision of Robert W. Wigton, president, Richard M. Hess, vice president of operations, and John K. McCarthy, general manager. Other officials of the company are Edgar Gray, mining engineer, Steve Mondack, assistant mining engineer, Erick Ostrofski, mine foreman, and Willis Baumgardner, maintenance foreman.



EFFECTIVE CROWDING action of loader on independently-powered crawlers leads to faster shaft mucking.

Crawler-Mounted Loader Speeds Shaft Mucking



DRILL CARRIAGE doubles as air and water manifold to serve drills. Carriage is lowered into shaft.



SUPERVISORS—K. Hawkey (left), and George Swan, Vecellio & Grogan, and A. E. Sadler, Pocahontas Fuel Co.



SMALLER SIZED ROCK is the goal in shooting, but occasional boulders, like this, are no bar to effective loading.



TWO HEADFRAMES have hinged floor on which bucket rests when loading men and supplies.

By FRED C. GRADDON, Sales Engineer, Eimco Corp.
and A. E. FLOWERS, Associate Editor, COAL AGE

SAVINGS IN LABOR REQUIREMENTS and improved safety are benefits resulting from the application of a new-type loader (Eimco 630 RockerShovel) for shaft mucking by Vecellio & Grogan, Inc., Beckley, W. Va., in sinking a shaft at Amonate, W. Va., for Pocahontas Fuel Co., Inc. Total depth of the 37x14-ft shaft will be 520 ft. It will intersect current workings and will be used as a service and ventilation opening.

Overlying rock is in a series of flat beds, ranging from very hard sandstone to very soft shale with occasional streaks of coal. Drilling and shooting requires about 8 hr in the sandstone and 3 hr in the soft shale. The 6-ft rounds usually show a clean break at the bottom. Frequently, in cleaning the bottom enough rock is ripped loose by the loader to provide another foot of advance in the round.

After shooting, the muck may be piled at one end of the shaft or at both ends with a V-shaped low spot in the middle. Early in the project, different methods of shooting were tried in attempts to obtain a flat muck pile. While this is still the aim, it is not critical, since the loader effectively handles the muck as it lays.

The RockerShovel discharges into buckets 3 ft high and 5 ft in diameter. Two standard headframes and two hoists are used over the large shaft, making it easy to spot the buckets any place on the bottom. After one bucket is loaded, the mucking machine simply spins around to load the second at the other end of the shaft. One bucket can be loaded in the time it takes to hoist the other to the surface and dump it.

There is an advantage in having the rock broken fine enough for easy handling, but so far the large rocks encountered have not seriously interfered with mucking speed. Mucking out the shaft and preparing the bottom for drilling the new round requires about 14 hr.

Sinking crews advanced the shaft 6 ft per day, but sinking is halted every 30 ft while the newest length of shaft is concreted. Since concreting time is about equal to sinking time, the overall advance of the shaft is 3 ft per day.

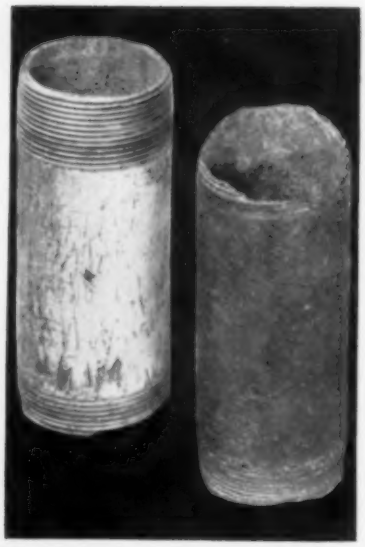
The drilling is done with seven Copco pneumatic drills using steel rods with tungsten-carbide inserts. In place of a drill jumbo the crew uses a specially-designed carriage made in the contractor's shops. The carriage, which serves as an air water manifold for the drills, is made of 3-in pipe, as shown in an accompanying illustration.

Operating procedure calls for all drills to be cleaned and checked and then placed in proper position on the carriage. After the loader has cleaned the bottom and has been brought to the surface, the drill carriage is lowered to the bottom and centered in the shaft. Air and water lines are connected between the carriage and permanent lines in the concrete shaft lining. Only one 50-ft length of 2-in hose is used for both drills and loader. Air is supplied at 100 psi, 75 cfm, by a Gardner-Denver compressor.

The crew consists on each shift of a boss, seven drillers, a top man, a mechanic and a hoist operator. One of the drillers operates the RockerShovel and the others service the drills and assist in mucking. Each of the three shifts is supervised by a superintendent, with the entire operation in charge of George Swan, general superintendent. A carpenter and a timekeeper also work on the day shift.



SURFACE Lightweight simplifies handling and installation in strip-mine drainage. Other applications include preparation plants.



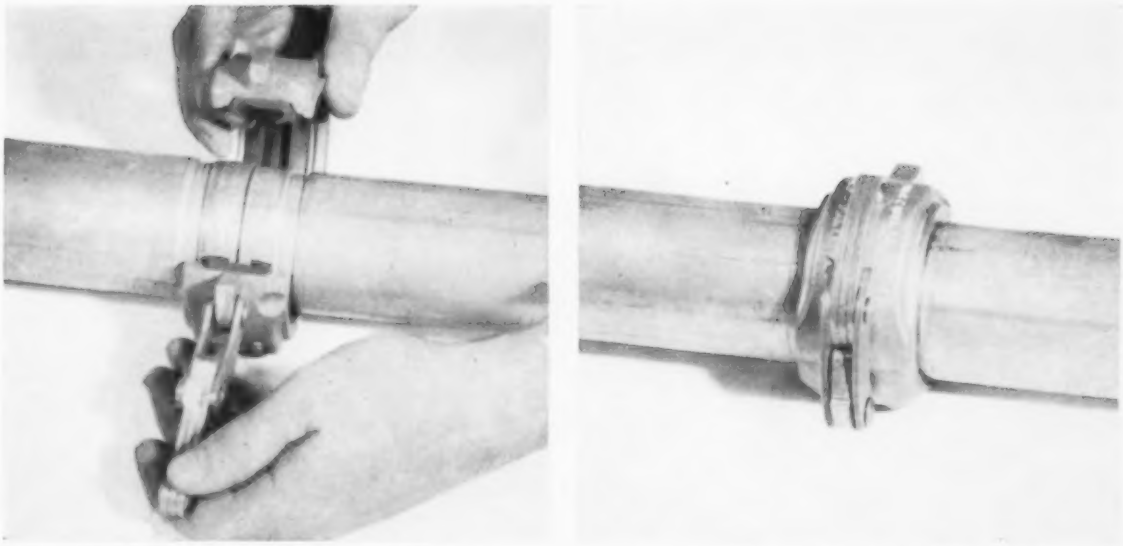
ACID TEST How aluminum pipe (left) and steel (right) looked after 60 days of exposure in one acid mine.

Aluminum

Where it can be applied and what it can provide in ease of installation and resistance to corrosion



UNDERGROUND Ease of handling is demonstrated by man carrying two 20-ft lengths into portal. Pipe also can be used for compressed air.



FAST COUPLING Rolled grooves and quick-acting snap-on couplings complement light weight in speeding up installation of aluminum pipe for coal-mine drainage and dewatering service.

for Mine Piping

By E. T. LONG, Project Director
Reynolds Metals Co., Louisville, Ky.
And JERRY GAMMON, Public Relations Dept.

LIGHTWEIGHT ALUMINUM PIPE may prove to answer some of the most vexing problems in mine drainage. Aluminum pipe has stood up well in actual installations. Its natural corrosion-resisting properties withstand the effects of mine water which, after seeping through coal beds and chemicals therein, usually becomes highly acid.

Reynolds Metals Co. assigned the problem of coal mine drainage to its Product Development Dept. several years ago. Aluminum pipe, the company reasoned, had stood up so well in similar uses—such as in the oil fields—it seemed likely to offer important advantages for mine use. Now, after much testing, which included actual installations at several mines, Reynolds has prepared comprehensive data on the performance of aluminum pipe, and is making supplies available in key mining areas.

First to be tested was 2-in-diameter heavy-wall aluminum pipe with threaded ends for coupling in the normal way. Early test installations showed advantages in using pipe with thinner walls, joined by a special snap-on coupling, in some applications. This thin-wall pipe is available in 1¼-, 1½-, 2-, 2½-, 3- and 4-in diameters. The 1¼-, 1½- and 2-in pipe has a wall thickness of 0.065 in. The larger sizes have slightly heavier walls, 0.083. Pipe in standard wall thicknesses, with threaded fittings, also is being manufactured.

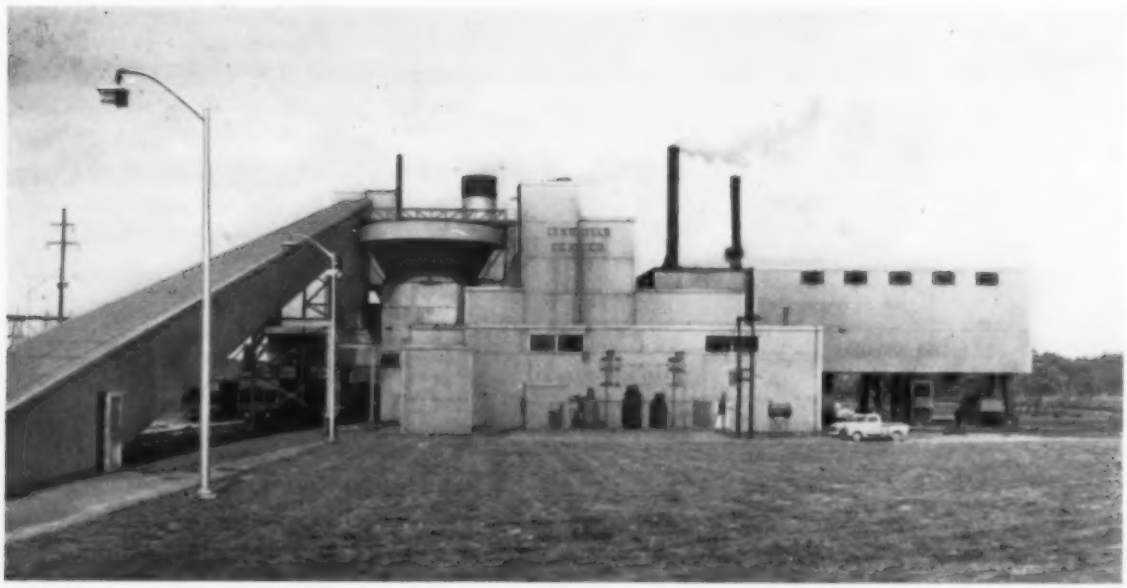
A typical test installation was made at a mine in which the water contained sulphur in a range of 3.5 to 4.0%. A section of 2-in aluminum pipe was laid at the same time as a section of the same size galvanized steel pipe. Both sections remained in service for 60 days. At the end of the 60-day test period, the aluminum pipe was only slightly corroded, while the steel pipe was so badly eaten that its threads were no longer usable and the pipe was replaced. Another section of aluminum pipe remained in service in the same mine for 12 mo. At the end of that period, the maximum depth of pitting on the pipe's interior was 35% of the wall thickness, and on the exterior, only 5%.

A pound of aluminum pipe gives three times more footage than a pound of steel pipe of the same wall thickness. The footage advantage is even greater for the thinner-wall aluminum pipe now being manufactured in the industry.

The labor-saving features of aluminum pipe are considerable. A 20-ft section of 3-in standard steel pipe weighs 152 lb and usually requires three men for installation. The same-size thin-wall aluminum pipe, in the same length, weighs only 21 lb and can easily be handled by one man of average strength.

Fast installation is made possible by roll-formed grooved ends on the pipe, which fit into special snap-on fittings. The grooves cause no loss of strength, since no metal is taken away by forming them. Bursting pressure tests on the 2-in pipe showed failure at 1,950 psi. The average actual bursting pressure required on mine drainage pipe of this size is only about 200 psi.

Aluminum pipe also has been installed for use as suction and air lines, and for gathering lines. Tests have been conducted using aluminum pipe in preparation plants. In all cases, it showed significant advantages. Aluminum pipe is also being used in various strip-mine applications.

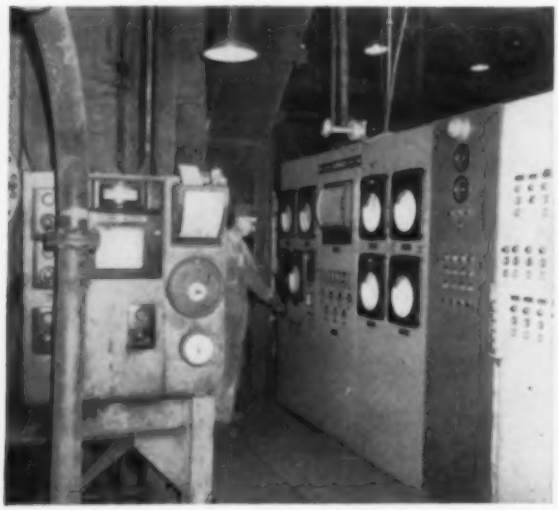


NEW LYNNVILLE PLANT includes thermal and mechanical drying, wet washing, tabling and refuse pumping. Plant area, including haulage roads and car-storage yards, is lighted by sodium-vapor units for night operations.

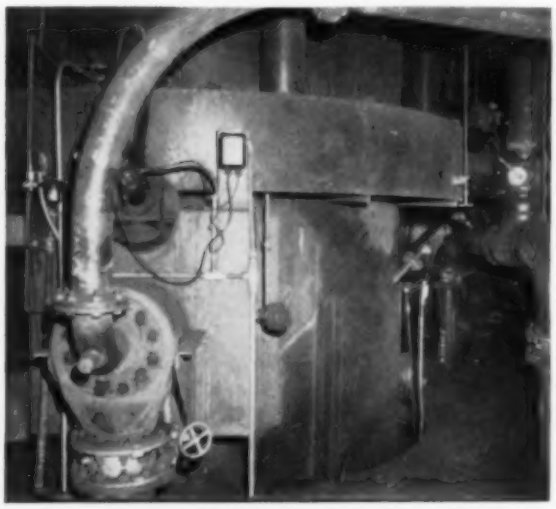
Modern Cleaning, Efficient

Fluidized-bed drying of fine coal, refuse pumping, coordinated two-bench stripping, close control of product quality, river loading are major features of Lynnville Coal Co.'s modern facilities.

CLOSELY-CONTROLLED TWO-BENCH STRIPPING and effective preparation in a modern plant, complete with the latest equipment for fluidized-bed drying of fine coal, are prime factors in creating high efficiency at Peabody Coal Co.'s Lynnville operation in the Lynnville-Boon-



CONTROLS of fine-coal drying system which handles 85 tph of 3/16x0, reduces moisture from 11% to 2%.



HOT GASES derived from 1 ton of pulverized coal dry from 60 to 75 tons of 3/16x0 feed in this reactor.



30-YD ELECTRIC DRAGLINE with 200-ft boom removes overburden from top bench of seam. Horizontal drill follows dragline to prepare next 90-ft-wide cut.

Stripping at Lynnville

ville, Ind., area. Opened in November, 1955, and now producing at a rate of about 1,000,000 tons per year, the facilities are designed for eventual output of 2,000,000 tons per year. The current output is achieved with the preparation plant in single-shift operation.

Lynnville Coal Co. is the latest member company in the southern Indiana region of the new, bigger Peabody Coal Co. The Lynnville property adds healthy backing to the facilities already in operation at the company's Victoria and Tecumseh mines in feeding coal to barges on the Ohio River over the company's Yankeetown dock, into railroad cars on the New York Central R. R. or into trucks for retail delivery to nearby industrial plants. About 60% of Lynnville's production now is being loaded over Yankeetown dock. Recently, Aluminum Co. of America decided to build a large aluminum plant to be operated on coal-based power a short distance down-river from the dock, the coal to be supplied on long term contract by Peabody mines.

Full operating responsibility for making a going concern at Lynnville rests with Merle Guthrie, mine superintendent, who came to Lynnville after closing out operations at Sunlight mine, near Boonville, another of the parent company's properties. Otis English is assistant superintendent, Ed Koerner is master mechanic, Howard Begler is preparation foreman and Norman Miles is pit foreman. Engineering headquarters for Lynnville, Tecumseh and Victoria are at Lynnville, with Eugene Samples in charge as mining engineer. George Morris is preparation manager for the Kentucky-Indiana mines of the company.

1956 COAL PREPARATION

Lynnville operates an unusual stripping, taking two benches of the Indiana No. 6 seam after removing the overburden and a thick parting between the benches which will be described later in the article. But the eye-catching feature of the property is the modern preparation plant, with its up-to-date architectural design, well-done landscaping and even a "boulevard" lighting system with sodium-vapor lamps for nighttime operation. The lighting system serves the haulage roads into the plant and the rail road-car storage yards.

The plant, which was designed by McNally-Pittsburg, includes circuits for (1) washing the minus 3-in coal in two McNally-Norton washboxes, (2) recleaning the minus 3/16-in on 15 Diester SuperDuty Diagonal-Deck tables, (3) mechanically dewatering the table product in three Bird centrifugal machines, (4) heat-drying the 1½x3/16 in two McNally-Vissac dryers and (5) heat-drying the coal from the Bird units in a Dorrco fine-coal dryer, the first application of the Dorr FluoSolids system in the coal industry.

FluoSolids techniques were first applied in the petroleum industry to improve the efficiency of catalytic refining, then the system was applied to roasting or drying of various ores. In coal-drying applications, the temperature of the fluidized bed of coal in the drying reactor can be closely controlled by the injection of air into the stream of drying gases, and the bed actually exhibits the flow and pressure characteristics of a fluid mass.

Here are some of the results achieved in Lynnville in the Dorr unit:

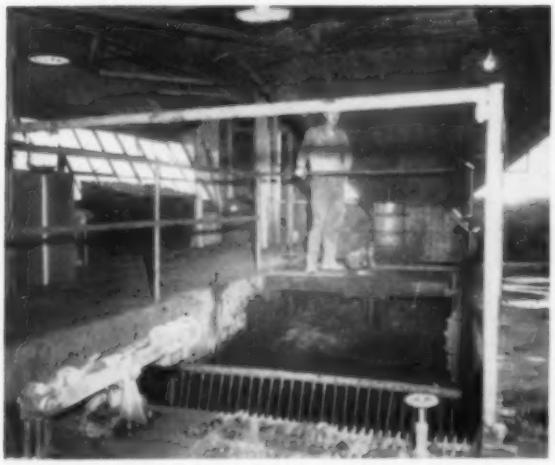
Feed entering the reactor is about 85 tph of 3/16x0 carrying 11% surface moisture. The reactor product averages 2% surface moisture. Source of heat for the drying gases is 1½x¼-in coal which is first pulverized in a Babcock-Wilcox pulverizer. Fuel consumption is 1 ton of fuel for drying from 60 to 75 tons of feed.

An auxiliary oil-burning system is maintained to provide drying gases if needed. The only major modification required in adapting the FluoSolids system to coal drying is the addition of a safety head in the reactor under the fluidized-bed zone to prevent the collapse of the bed material into the bottom of the reactor in the event the stream of drying gases should be interrupted. In the absence of such a safety head, which is made of closely-spaced bars, the coal could drop into zones of higher temperature in the reactor.

Some of the product flows out of the reactor through ports immediately above the safety head, as shown in the accompanying diagram, and the remainder is trapped out of the stream of gases in two stages of twin Ducon cyclones. The stream is created by air from two Spencer blowers.

LYNNVILLE'S FLOWSHEET

Raw coal hauled from the pit by truck and by a company railroad is dumped into a 250-ton plant-feed hopper. A 60-in reciprocating feeder under the hopper discharges into a 30x60-in McNally double-roll crusher which provides 6x0 raw coal for the 42-in plant-feed conveyor at a rate of 900 tph. At the top of the plant the raw coal is transferred over a 60-in feeder belt onto a 6x14-ft Tyler vibrating screen which makes a separation at 3 in. The 6x3 is crushed to minus 3 in and the recombined stream of raw coal is split between the two washboxes. (*Text continued p 80*)



TWO WASHBOXES, one 4-cell and the other 6-cell, receive 900 tph of 3x0 raw coal at top of preparation circuit.



TWO SCREEN-TYPE DRYERS each handle 175 tph of $1\frac{1}{4}$x$\frac{3}{16}$-in coal, separated on classifying screen.



BOTTOM-DUMP TRUCKS from pit, or railroad cars, discharge into 250-ton hopper serving plant-feed conveyor.



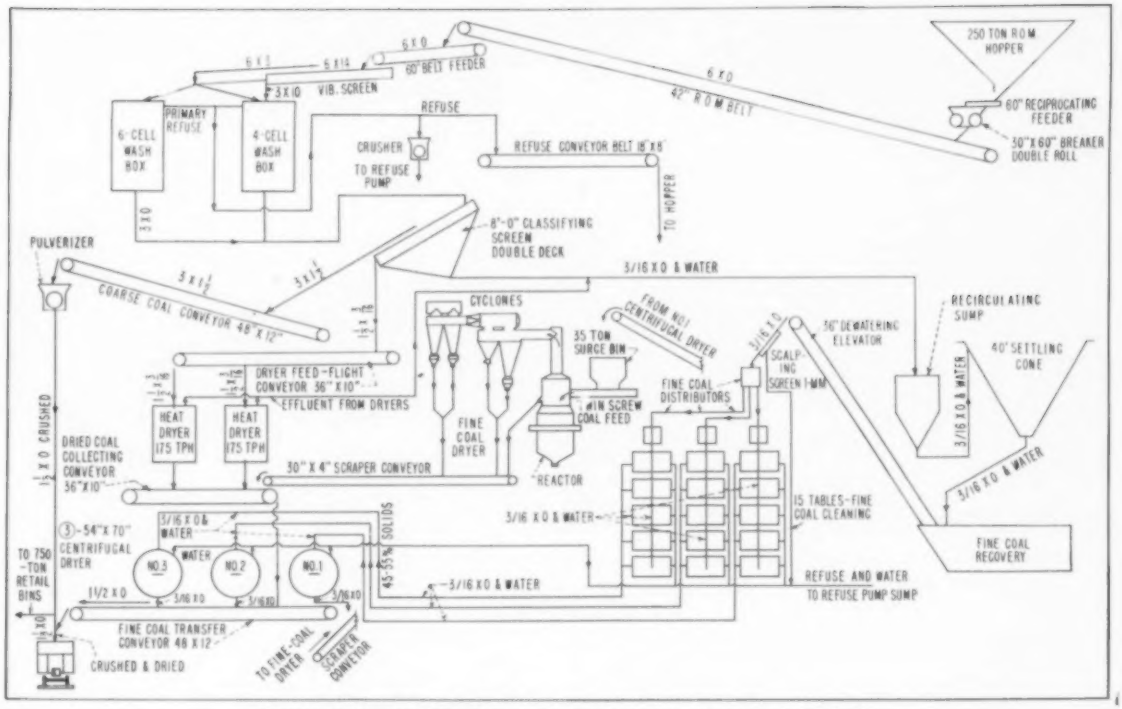
MINUS 3-IN REFUSE IS PROPELLED by this 8-in pump into refuse basin where water is clarified and collected.



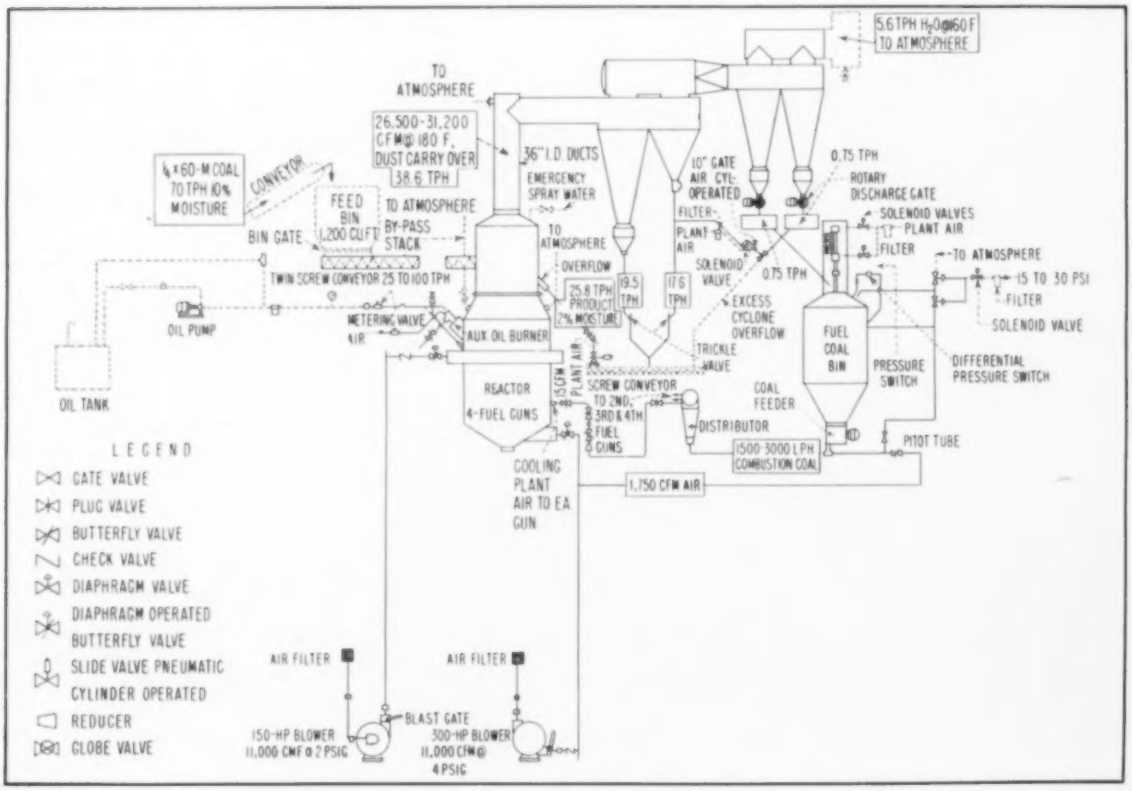
WELL-EQUIPPED LABORATORY, operated by Robert Hewitt, coal analyst, provides constant check on product quality and plant efficiency.



MERLE GUTHRIE, general superintendent runs Lynnville operations.



HOW LYNNVILLE'S COAL is cleaned and dried in up-to-date plant



INSTALLATION DIAGRAM of fluidized-bed drying system



ELECTRIC LOADING SHOVEL, equipped with a 6-yd coal bucket, removes coal from a 6-ft-thick bottom bench. Bulldozer at left cleans top of coal and builds ramps for haulage trucks. This is final phase of two-bench stripping.



SECOND LOADING SHOVEL, for recovering the thinner top bench, is equipped with a 5-yd bucket having extra width to insure a full bucket with every pass.



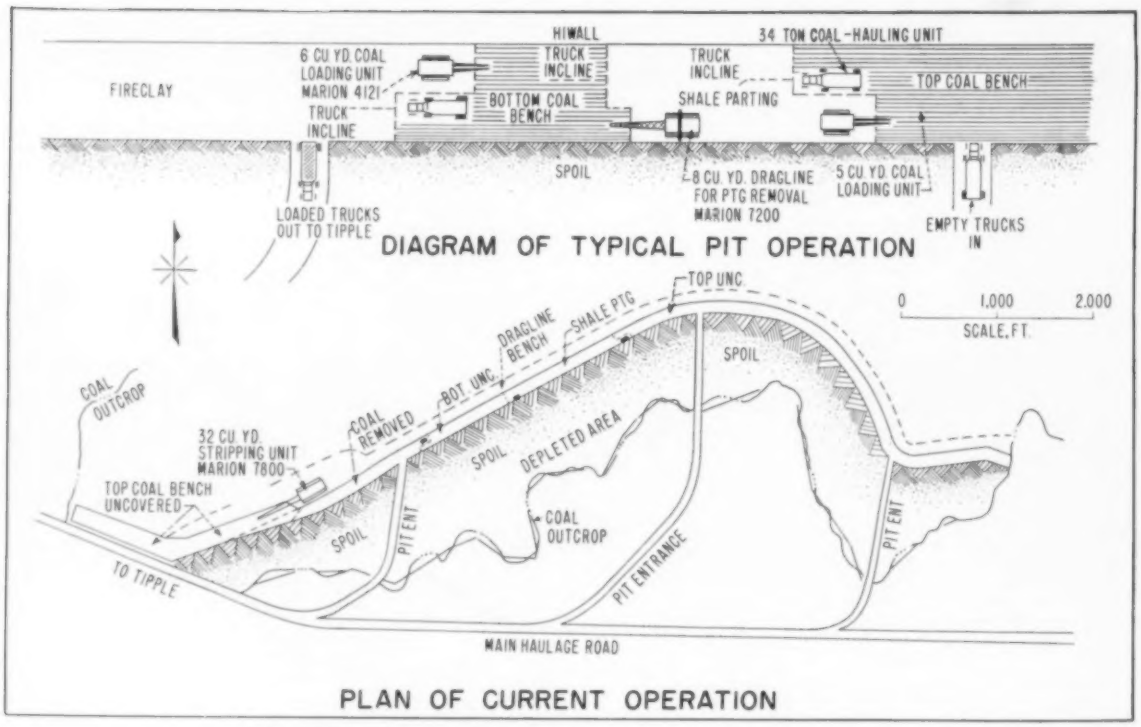
WALKING DRAGLINE with 6-yd bucket removes parting between top and bottom benches of coal. The parting is broken by explosives for easier loading.

As shown in the flow diagram, the 3/16x0 with excess water is removed as the underflow of an 8-ft classifying screen and directed through a dewatering circuit consisting of a 40-ft settling cone and a recovery tank. Fines from the recovery tank provide feed for the wet tables.

Primary refuse from the washboxes is passed through a 36-in Jeffrey Flextooth crusher to insure reduction to minus 3 in, since this material is pumped out of the plant into the disposal area. Refuse is gathered in a sump ahead of an 8-in Morris pump to be propelled through 150 ft of 6-in pipe into the disposal area. Some refuse is conveyed to a hopper, as needed, for use as road-surfacing material.

The plant employs 13 men, including the preparation foreman and two car droppers. Duties of the others are as follows: One jig operator, a table operator, a Dorr-system operator, a Vissac operator, an oiler, a pumpman, a loading-boom operator and three men for cleaning and preparing cars for loading. Water circuits in the plant handle 9,500 gpm circulating water and 2,000 gpm makeup water, which is introduced mainly through sprays over the screens.

The plant is doing an excellent cleaning job, according to its operators. The record month to date shows a production of 295,000 tons of clean coal.



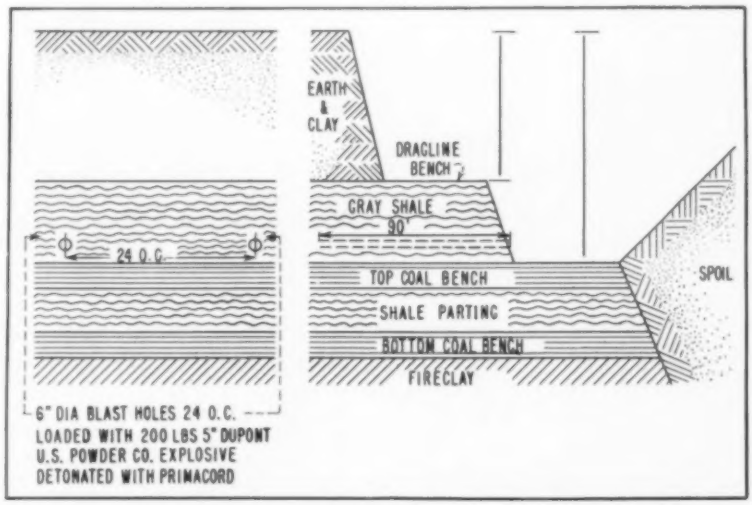
SEQUENCE OF OPERATIONS in recovering two benches of coal

QUALITY CONTROL

Analyses of the products of the Lynnville plant are determined at frequent intervals to maintain a running check on the quality of the coal being shipped. Furthermore, float-sink tests are made at frequent intervals to check the operating efficiency of the cleaning units. Up-to-date equipment for making these tests has been installed in a laboratory in the basement of the office building. The laboratory is operated by Robert Hewitt, coal analyst, under the supervision of George Morris, preparation manager of the division.

Samples are taken in the air across the full stream of the loading-boom discharge as the railroad cars are loaded. Ash determinations are made every half hour on each size. Complete screen analyses are made periodically and always at the beginning of each size run. Float sink tests at 1.5 sp gr are made three times daily.

Accurate reports of all these tests and of all preparation-plant delays are posted in the laboratory records, covering all the coal produced by the mine from opening day until final abandonment. This has been standard operating procedure at all other mines operated by the company. These data then are consolidated into weekly, monthly and annual operating reports to provide management with invaluable guides in bidding on long-term contracts or in designing new mines and plants.



STRIPPING OPERATIONS and shooting pattern at Lynnville pit

How Lynnville Strips Two Benches of Indiana No. 6 Seam

The pit at Lynnville is approximately 2½ mi long served by access roads leading from the main haulage road through the spoil area on approximate 2,500-ft centers, as shown in an accompanying diagram. The open pit is from 80 to 90 ft wide. The sequence of operations includes (1) preparing and stripping the overburden, (2) loading the coal from thetop bench, (3) re-



UP TO 60% OF LYNNVILLE'S PRODUCT is loaded into Ohio-River barges over Yankeetown Dock. Mine and dock have direct rail link.



SERVICE CENTER includes engineering offices, truck garage, mine shops and parts-supply storeroom under one roof in modern building.



MINE OFFICE BUILDING is administration center and also contains coal laboratory and weighmaster's station for complete control of the job.

moving and spoiling the thick parting between the benches and (4) loading the coal from the bottom bench.

The major stripping unit is a Marion 7800 walking dragline swinging a 30-cu yd perforated Hendrix bucket. A 6-yd Marion 7200 removes the parting. The two loading shovels are Marion 4121's, one with a 5-yd bucket for loading in the thinner top bench and the other with a 6-yd bucket for use in the thicker lower bench. The 7800 works three shifts a day, the 7200 works two shifts, and the loading shovels work one shift.

The Marion 7800 works from a dozer-constructed bench along the top of the highwall to remove soft surface material and blasted shale from the top bench of the seam. Cover now is about 30 ft thick, but it will become thicker as the work proceeds toward the rear of the property.

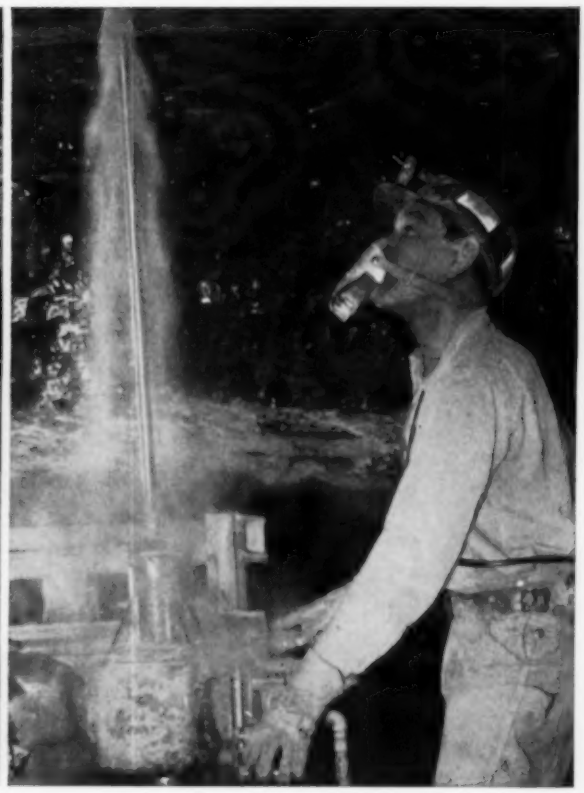
A Sullivan horizontal overburden drill closely follows the 7800 dragline to drill blastholes in the shale for the next cut as the solid highwall is exposed by the stripper. The drill works from the top of the top bench of coal ahead of the loading operation. The 6-in blastholes are drilled 90 ft into the shale on 24-ft centers, and are charged with 150 lb of du Pont 401 explosives in 5-in, 25-lb cartridges. Overburden thickness at the back of the property increases to a maximum of 80 ft, and the charge in each blasthole will be increased accordingly.

The top bench of coal is from 2½ to 3 ft in thickness. The parting varies from 2½ to 10 ft in thickness, and exploratory drilling shows that in some areas the parting is 22 ft thick. The bottom coal has an average thickness of 5 ft. After the top coal is loaded out the parting is drilled by a small vertical drill and broken by explosives to facilitate removal of this material by the Marion 7200. The second loading shovel then recovers the bottom coal.

The haulage fleet consists of six Mack and four Hendrickson 30-ton tractor-trailer units. Garage space is available in the service building, which also houses the engineering department, a storeroom and a shop. Service facilities at Lynnville include a truck-mounted welding outfit and two welding machines mounted on the 7800 dragline.

Drainage and pumping require strict attention since the southern Indiana area receives an annual rainfall amounting to 50 in or more. A diversion channel has been constructed along the entire length of the operation beyond the highwall, and sumps are constructed as needed in the pit to collect water to serve the main pumps.





KENNAMETAL* DC-1¾ and FDH-1½ bits solve unusual roof drilling problem

THE PROBLEM: In mining fire clay at its slope mine in Cordova, Alabama, NATCO faced an unusual roof bolting problem. A 24″ seam of coal, the Upper Mary Lee seam, lies immediately over the 48″ vein of clay. This creates an unusual roof bolting problem, particularly since care must be taken that the clay is not contaminated by the coal, which is taken down only in entries and haulage ways.

SOLUTION: In rooms, Kennametal DC-1¾ bits are used to drill through the coal and Kennametal FDH-1½ bits drill 26″ into the slate and sandstone top. Kennametal PRSB Pinning Rods are used in both drillings. The 48″ roof bolts set on 4′ centers pin the coal to the top and, at the same time, control the roof.

In entries and haulage ways, after the coal has been removed, the slate and sandstone roof is drilled and pinned in the conventional manner, using the Kennametal FDH-1½ bits for drilling.

RESULTS: NATCO gets an average of 12 to 14 regrinds on the DC bits, which are changed once every two weeks, and 10 to 12 FDH bit regrinds, which are changed every 6 holes.

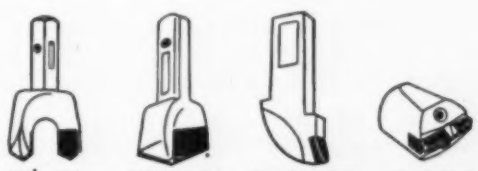
Using this combination, one man drills and pins an average of 60 holes in 7 hours.

No matter what your cutting or drilling problems are, you will find a Kennametal Bit to do the job fast, with low bit and maintenance cost, and long bit service. Discuss your problems with a Kennametal representative. Or write KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Registered Trademark

Ask about the Kennametal line of augers, pinning rods and accessories

INDUSTRY AND
KENNAMETAL
...Partners in Progress



FOREMEN'S FORUM



Why Do Some Foremen Fail?

There is a delicate balance between getting the job done while promoting good human relations. Subpar performance on either score leads to eventual supervisory failure, executives say.

"THE INDUSTRIAL FOREMAN must have a stable temperament if he is to cope with the difficult job of supervision." So say top-ranking business executives who were asked by the National Management Association (NMA), "Why do some foremen fail?" Among NMA's membership are 360 management and foremen's clubs with 70,000 members.

Marion N. Kershner, executive vice

Laytex® Royal Master Portable Cables



Front end of shuttle car, on way to dump, showing U. S. Laytex Royal Master Cable leading out from front. Surroundings are rugged.



U. S. Laytex Royal Master Cable leads to main power supply, and is constantly being yanked over the sharp surfaces.



Loaded shuttle on way to dump coal onto conveyor. U. S. Laytex Royal Master Cable is always kept under tension so it will better ride the reel.

"We give cable a battering punishment... our production quotas have no use for weaklings,"

says super of Truax-Traer Coal Co.

This coal mine (in West Virginia) uses U. S. Laytex Royal Master Portable Cables on its cutting and loading machines, and on its shuttle cars. "We don't make a policy of abusing equipment," says the superintendent, "but our production quota really puts the heat on U. S. Royal Master Cables. We pull them along rough facings; in an 8-hour shift, a buggy will pay out or take up the cable as often as 80 times."

The cables are constantly under tension resulting in pressures as high as 600 lbs. per square inch, and must take continual jerking. The officials of the mine are impressed by U. S. Royal Master's superior performance. One of them says, "We can't afford to baby cable. Anything that slows down getting out coal has no place on our wanted list."

U. S. Laytex Royal Master Portable Cables are obtainable at your "U. S." branch, your distributor, or write Electrical Wire & Cable Dept., Rockefeller Center, New York 20, N. Y.

Electrical Wire & Cable Department

United States Rubber

president of NMA, reports that the organization determined to find out the basic reasons for the failure of some supervisors to measure up to expectations. There are some foremen who disappoint top management with poor performance of managerial duties. On-the-job failures among these foremen prove frustrating to all other foremen who desire immediate acceptance as bona fide management personnel.

QUERYING MANAGEMENT

Questionnaires were sent by NMA's research department to a representative group of executives throughout the country, and 61% of those queried replied. The question—"Why do some foremen fail?"—was designed to permit maximum freedom in answering. Most respondents wrote extensively and many of their replies contained the reflections of their entire staffs.

Here are some of the conclusions:

There was general agreement among executives in such matters as proper selection of foremen, training, communications, desirable attitudes and the need for healthy human relationships. However, there were varying reactions with regard to what constitutes good relationships and how much emphasis this matter should receive. Some of the comments are as follows:

"**To become a successful foreman,** one must, among other things, like people and know how to get along with them. . . ."

"With the emphasis we place on human relations, new supervisors frequently get the impression that their main job is to keep their employees happy. They miss the point that their main mission is to get the job done. . . ."

"Call the reason what you will—negative social attitude, social incompetency or just plain arrogance and irritability—the greater percentage of foremen failed because they would not accept and apply the basic principles of good human relationships. . . ."

MANAGEMENT SHORTCOMINGS

However, the executives did not close their eyes to their own faults. Apparently they believe some of the responsibility for supervisory failures lay with themselves. Here are the faults they laid at their own doorstep:

1. Inadequate training of foremen.

2. Inadequate selection and training methods.

3. Failure to define and spell out what is expected of foremen.

4. Lack of follow-up by the foreman's superior through counseling and by evaluating the foreman's performance.

5. Poor management communications, especially in disseminating policy decisions from board chairman to foreman.

6. Failure of executive management to provide proper motivation through both monetary and non-monetary incentives.

Other factors, such as union infringement on the foreman's authority and labor's reluctance to accept foremen as part of management were mentioned in the returned questionnaires but not weighted as heavily as the six points above.

SUPERVISORY SHORTCOMINGS

The executives held foremen responsible for their own failures in these respects:

1. Inability to deal effectively with personal relations problems, both with workers and with other management men.

2. Personal shortcomings, such as lack of initiative and emotional instability.

3. Lack of management attitude and understanding.

4. Unwillingness to spend some leisure time and effort on managerial self-development.

5. Inability to effectively plan and organize work, and to adjust to changing conditions.

On one point, there was no disagreement. It is that the foreman's job is a very difficult one, highly exacting in personal requirements. Illustrating this, one executive said, "We long ago discovered that we must inquire into the temperamental make-up of an individual to find whether or not he possesses a genuine aptitude and liking for the rather complex job of guiding the work of others.

"To us, skill and competence in a given field of industrial endeavor is always secondary to the requirement that a management man be able to work successfully with people. Such individuals are rare."

. . . AND IN COAL MINING

Your commentator adds here some pitfalls to be avoided by coal-mine supervisors, as follows:

Do not avoid the strict enforcement of safety rules.

Leave your personal troubles and dislikes outside the property limits.

Pay attention to detail because your job, above all others, should show no loose ends.

Don't be tardy—for work or staff meetings.

On the other hand, don't fill your mind with thoughts of failure. Enjoy your work, grow with it and you'll do just fine.

Vacation Hints

You may have taken your vacation during the recent miners' vacation or your holiday may still be ahead of you. In any event, the summer will be with us for a few months and some reminders may be in order.

Drive safely. Don't let a highway accident spoil a gay outing.

Observe the rules of water safety. Be very careful, especially, in taking children into boats. No horseplay!

Avoid excessive sunburn. It's like any other burn—it's an injury.

Keep children away from outdoor grills that might be upset.

Safety is important at all times. Don't leave your safety sense at home when you sally forth on a holiday or vacation.

Communicating

ONE OF THE MOST DIFFICULT of all supervisory duties, we believe, is receiving and passing along information without damaging its original intent or message. No doubt you have often heard of how a scrap of truth is caught up in the gossip mill, showing up sometime later in greater length and full of spurious detail. Such inversion of a simple truth is not done maliciously, in most instances. It happens because we are thoughtless, more or less, in our communications with others. We do not use our faculties for communicating to their fullest capacity. Naturally they wither from lack of exercise.

Most of us have our five senses through which we can receive and transmit information from and to others. There can be no reason for faulty communications other than this: We fail to use the God-given senses we have.

We have been very much moved by reading a book entitled "Helen Keller, Sketch for a Portrait," by Van Wyck Brooks. Helen Keller was left at an early age without sight and without hearing; yet her ability to communicate with others is beyond compare.

She was not aware that she had the power of speech because she could not hear other voices. The barriers around her could not be broken down by the written word because she could not see the message. Her world was dark and silent.

However, through patient teaching by a lady named Anne Sullivan and through Helen Keller's own spirit the barriers were broken. "Teacher" would pour water over Miss Keller's hand, then spell out the letters w-a-t-e-r in the palm of her hand. In this way Miss Keller learned to communicate. The world opened before her, and hers is a bigger world than ours, our sight and hearing notwithstanding.

As long as I live I shall have problems in communicating with others, in keeping messages straight, in getting my meaning understood by others. But if I should become impatient in these situations, I will think of Helen Keller and be very much ashamed of myself. Inability to communicate effectively is an acquired shortcoming, just as the ability to communicate is an acquired and carefully nurtured talent.



Why Zacherl Coal Company is switching to Caterpillar power

A little over five years ago, Zacherl Coal Company of Oil City, Pa., installed a CAT* D318 Diesel Engine in a Lorain shovel. In the more than 5 years of tough operation, *the engine has not been touched.* Since then, the company has bought nothing but Caterpillar power: a D375 in a P&H 80-ft. dragline, a D337 in an Osgood shovel, and a D318 in a Bucyrus-Erie shovel.

The firm is now 80% standardized on Caterpillar power. "As long as we get this kind of service we'll stick to Caterpillar," says Eugene Zacherl, a partner.

Many experienced coal men know that it pays to standardize on Caterpillar Diesel Engines. With their aluminum alloy bearings, "Hi-Electro" hardened crankshaft and cylinder liners, foul-free fuel injection and really effective oil, air and fuel filters, Caterpillar Engines are designed to do more work at lower cost over a longer time than any other engines built.

There is a full range of new and modern Caterpillar Diesels to 650 HP (maximum). Leading manufacturers install Caterpillar Engines as original power in their equipment. And there's a Caterpillar Engine as replacement power for almost any shovel ever built.

See your Caterpillar Dealer for full information on the new line of Caterpillar Diesels. And specify Caterpillar when you repower or order new equipment.

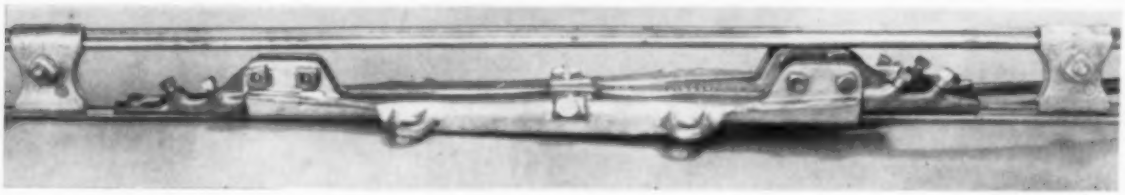
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

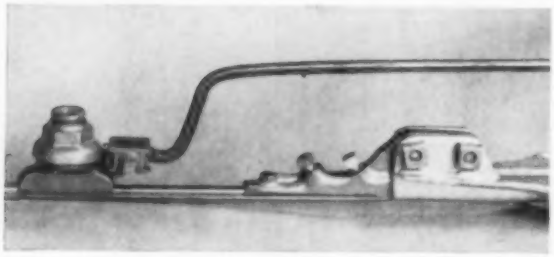
CATERPILLAR*

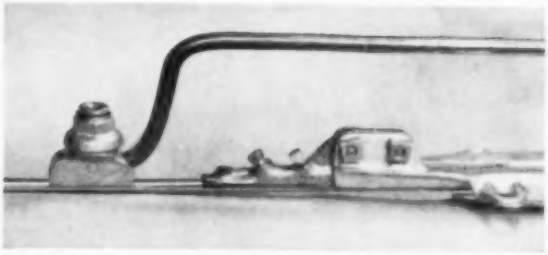
*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

MODERN HEAVY-DUTY POWER

OPERATING IDEAS







Jumpers Prevent Overheating in Trolley Frogs

A TROLLEY FROG IS A MECHANICAL DEVICE. It was made to guide the current collectors, withstand abrasion of the shoe flanges, and support the load of the trolley wire. This demands a material having high mechanical strength, not an unusually high current-carrying capacity. Thus setting the stage, an item in the May issue of *Haulageways*, Ohio Brass Co. publication, goes on to tell how overheating in trolley frogs can be prevented by installing jumpers, as shown in the accompanying photos. Trolley wire from which the jumper is made need not be bent if combination trolley-feeder clamps are used (top photo). However, if other type clamps are the only ones available, it will be necessary to bend the jumper slightly, as shown in lower photos, to clear the clevis ends of the frog.

As explained in *Haulageways*, the overheating in the frog may occur when the capacity of a mine circuit temporarily fails to keep up with increasing electrical loads at the face; for example, during periods of rapid expansion and mechanization. Under normal conditions, the frogs will carry normal current if they are properly installed and maintained. But if overheating should occur, you may want to consider these jumpers as a solution to the problem.



Special Arms Speed Loading

FASTER LOADING of fine coal is accomplished at Eastern Gas & Fuel Associates' Sonman mine with special arms on loading machines. The special arms are used on pickup loaders working behind continuous miners. Since the coal is comparatively friable, a large percentage of fine coal is produced. This fine material could not be loaded as fast as coarser material. Therefore, the company decided to add plates to the digging arms so more coal could be scooped up with each stroke. Two 8x8-in steel plates were welded to the end of each digging arm. One plate was welded in a vertical position and the other in a horizontal one. This formed an L-shaped scoop on the end of each digging arm. The company reports that the loading rate has been increased significantly by adding the plates to the arms.

US RUBBER CONVEYOR BELTS



Close-up of U.S. Giant Belt carrying raw coal from one of the two semi-portable hoppers of this overland conveyor system.

"A revolution in strip mining . . ." SAYS SUPERINTENDENT

"U. S. Conveyor Belt helps us save $1500 per week"

At the Will Scarlet mine near Stonefort, Ill., the outstandingly successful use of the first overland belt conveyor at an Illinois strip mine has the coal industry watching closely.

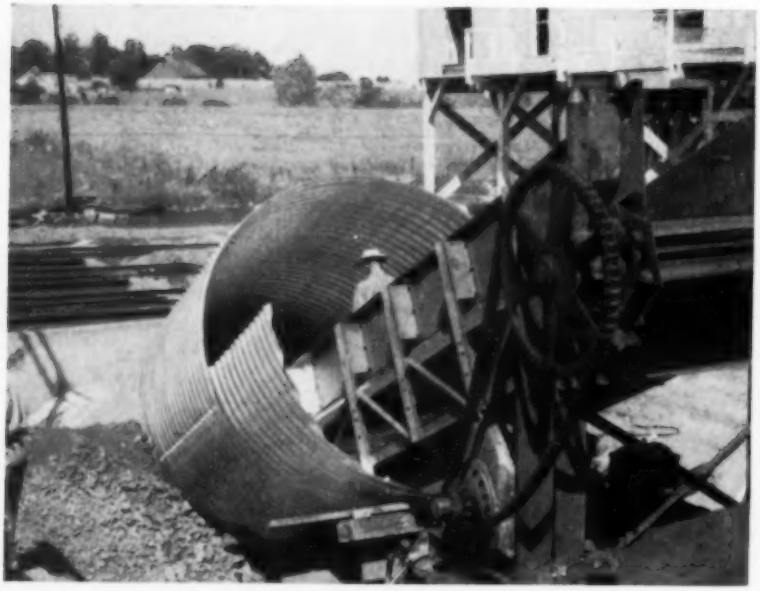
Installing a portable overland conveyor belt system, using a U. S. Giant® Belt, considerably reduced the number of trucks and crews, eliminated extra roads and high maintenance costs. The belts help permit large coal stockpiling for continuous operation: miners can continue working without a tippling operation—or the tipple can produce without a mining operation. The system can be moved to any location on the 3,000-acre tract. As the pit progresses overland, they simply add to the length of the belt.

Says the superintendent: *"Only 2 men are required to operate the conveyor. Our maintenance costs are very low. Altogether, the belt helps us save $1500 per week. We intend to install additional 'U. S.' Belting soon."*

This success story is the result of U.S. Rubber's exclusive "Three-Way Engineering," in which "U.S." engineers work closely with the engineers representing the mine operator and engineers representing the conveyor equipment manufacturer. This service and a complete line of conveyor belts are obtainable at any of the 28 "U.S." District Sales Offices, at selected distributors or by writing U. S. Rubber, Mechanical Goods Division, Rockefeller Center, New York 20, N. Y.

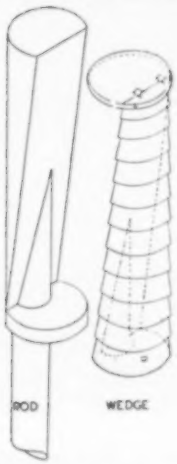
US RUBBER Mechanical Goods Division

United States Rubber



"Do-It-Yourself" Conveyor Housing

SAXTON COAL CORP., Somerville, Ind., built this conveyor housing using Armco pipe 10½ ft in diameter. The 52-ft-long housing seals the elevating conveyor which conveys the coal from the track hopper to plant.



Sliding-Wedge Roof Bolt Is Made With Two-Piece Head

THE ROOF BOLT at the left, described in *Colliery Guardian*, a British-coal-mining magazine, consists of a ¾-in mild steel rod, tapered at its end for 6 in to receive the serrated wedge to form a cylinder. As designed by Frederick Sidney and Keith Shaw, National Coal Board engineers, the assembled unit is inserted into the hole and the wedge is initially set by smartly pulling on the projecting end of the bolt. A rubber or plastic retaining disk on top of the wedge keeps the wedge stationary at the back of the hole. The disk is of slightly larger diameter than the drill hole. The lower end of the bolt is threaded to receive a bearing plate and nut. Final set of the bolt is achieved by tightening the nut.



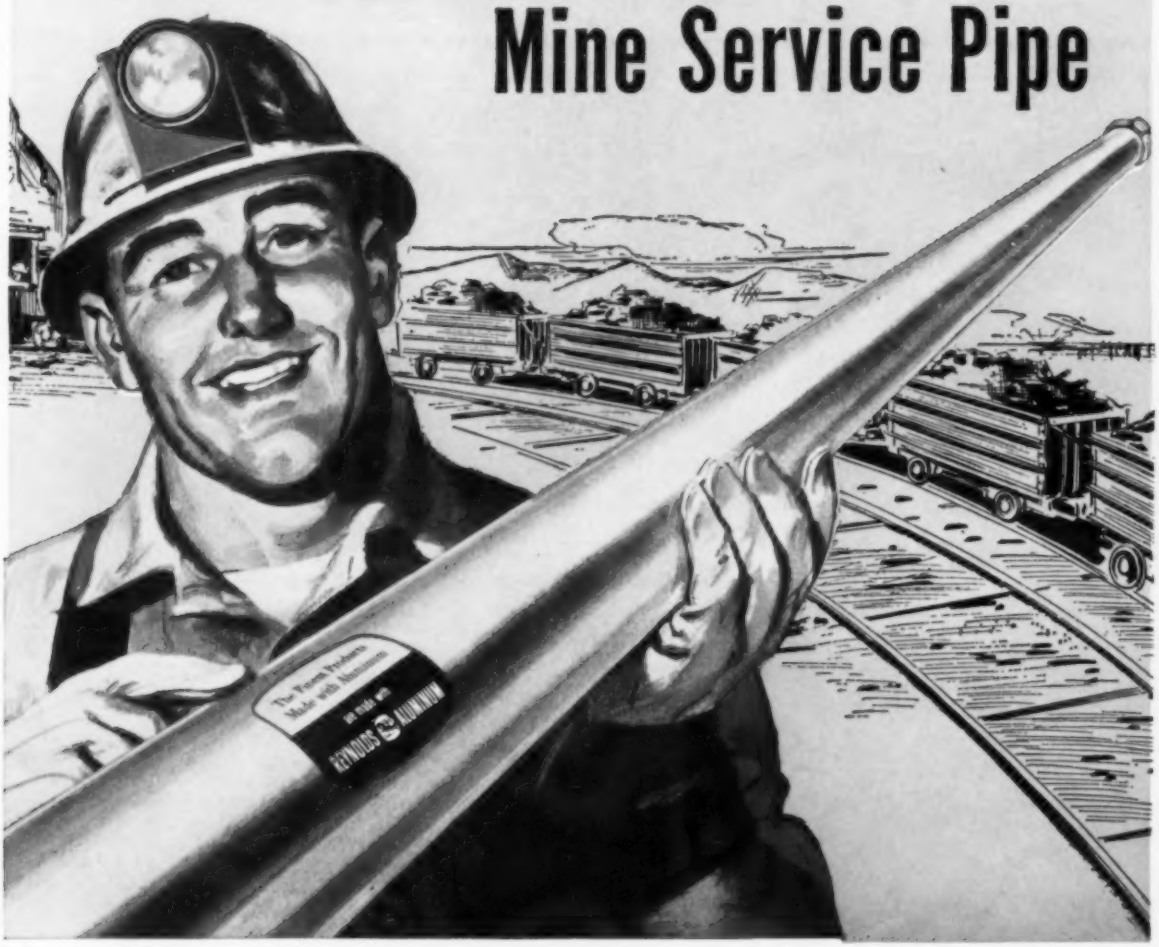
Changing Tires Faster on Mine Locomotives

TWO OXYACETYLENE BLOWPIPES lead to considerable savings in time and effort at a western Pennsylvania shop in replacing worn tires on mine locomotives, according to *Linde Tips*. One of the blowpipes is for cutting off the old tire and the other for heating the replacement tire.

Previously, it took two men 2½ hr to replace the worn tires on a single axle. The process involved heating the wheels over a coke fire and driving off the worn tires, then heating the new tires and driving them on. Uneven heating and distortion frequently resulted.

Now the cutting torch is used to make a cut from the outer edge of the tire back through the flange on opposite side of the tire. The two halves are knocked off with relative ease. Meanwhile a new tire is being heated with the other blowpipe to expand it for mounting on the hub. The speed of rotation in heating is about 3 rpm and the time required is from 15 to 20 min. This results in an expansion of 1/16 in in the I. D. of the tire. It is reported that two tires on a drive axle can be changed in from 45 to 50 min.

NEW! Reynolds Aluminum Mine Service Pipe



Faster, lower cost installations for Temporary Pipe Lines

Now lightweight, corrosion-resistant Reynolds Aluminum Mine Pipe brings new labor-savings and much longer service life to coal mines. Using quick couplings, one man can quickly join pipe sections. And aluminum pipe and couplings easily accommodate coal mine working pressures for drain pipe, air intake, and water intake lines.

Lightweight lowers installation time. Aluminum saves up to 90 percent of the weight of heavy steel pipe.

Quick Couplers Available. Several manufacturers supply high-grade coupling devices to meet mine layout requirements.

Corrosion Resistance Extends Service Life. In one mine with 3.5% sulphur, aluminum pipe is still in service after two years. Standard steel pipe had and average life of less than 3 months.

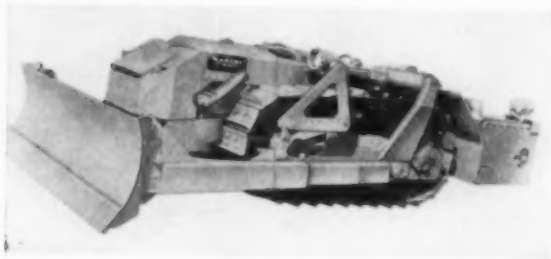
For further information about Reynolds Aluminum Mine Service Pipe and availability from nearby distributors, write *Reynolds Metals Company, P.O. Box 1800-NQ, Louisville 1, Kentucky.*

Write for new brochure "Reynolds Aluminum Mine Service Pipe".

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

See "FRONTIER", Reynolds exciting dramatic series, Sundays, NBC-TV

EQUIPMENT NEWS



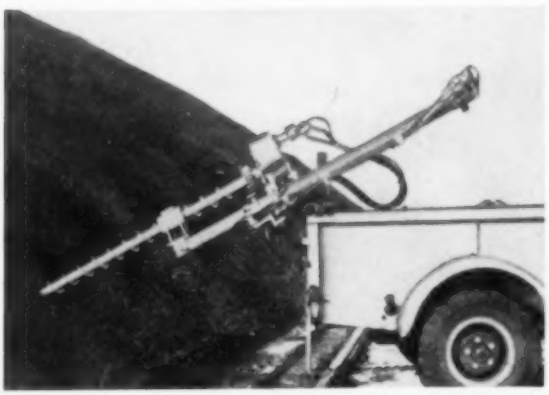
Underground Electric Tractor

A Caterpillar D4 tractor equipped with a 40 hp, 250 v, DC electric motor is being distributed by the Whayne Supply Co., 800 W. Main St., Louisville 1, Ky. Named the Whayne D4 E Coal Tractor, or "Coal Cat," the unit is designed for underground work. It can be equipped with an angle-type or straight-type dozer blade and with removable cutting edges and end bits for hydraulic operation. It can also be equipped with a hydraulically-driven cable reel with a spooling device for level-winding 500 ft of No. 2 conductor mining machine cable. The D4 E contains 5 forward speeds up to 4.4 mph and will travel 1.6 mph in reverse. Track shoes (31 on each side) are 13 in wide. Its length of track is 5 ft 1⅛ in. Overall length is 178 in, width 90 in, height 48⅝ in, weight 11,000 lb. Each track is controlled by a slow speed, heavy-duty, dry multiple disk clutch and contracting break band actuated by a combination control system. Whayne says that one machine is being used at U. S. Steel's Lynch mine for clean up work and for moving coal to loaders.



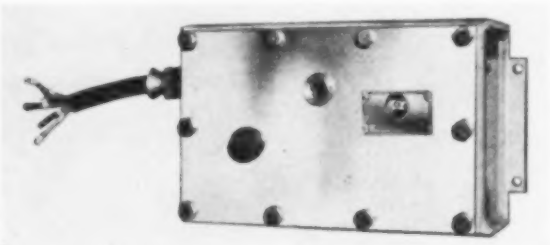
V-8 Engine-Equipped Truck Line

International Harvester Co., Motor Truck Div., Chicago 1, Ill., has disclosed that it is manufacturing a new "V-line" of heavy-duty trucks featuring three new V-8 engines. Nine series of trucks in conventional and cab-over-engine, four and six-wheel design, comprise the group. The models are being made with gross vehicle weight ratings of 24,000 lb and up and gross combination weights of 50,000 lb and up. The new engines, tested during some 1 million miles on the road, are rated at 206 hp, 226 hp and 257 hp (cu in displacement: 401, 461 and 549). Short rigid construction and low-friction design are among the characteristics of the trucks, according to International. Conventional four-wheel models: V-195, V-200, V-210 and V-220; six-wheel models (photo): VF-190 and VF 200 series; cab-over-engine: VCO-195, VCO-200 and VCO-220.



Drill Takes Augers 3 to 12 In.

Cardox Corp., Chicago 1, Ill., has introduced a truck-mountable general purpose drill that is hydraulically powered and hydraulically controlled. The unit is designed to receive augers from 3 to 12 in and will drill vertically, horizontally and at any angle between vertical and horizontal. Mounting can be accomplished on any flat-bed truck, crawler or farm-type tractor. In fact, says Cardox, the drill can be mounted, if necessary, on any mobile equipment equipped with a power take-off to drive the drill's hydraulic system. Maximum feed rate is 20 fpm.



Ground Fault Protector

Ensign Electric & Mfg. Co., Huntington, W. Va., is producing the "Ground-I-Cator," an instrument designed to provide continuous ground fault protection for off-track equipment. Certified under Bureau of Mines file X/P-712, the unit closes a control circuit when power is applied to trailing cable. Should a machine frame potential rise above 40 v, the "Ground-I-Cator" stops the machine by opening main line contactors. Should a fault be outby the line contactors or in a cable reel the unit will operate to stop the machine and a safety ground light will indicate unsafe conditions. The instrument, says Ensign Electric, can also be used as a continuous check on

CP roof bolting unit increases tonnage 25%

When a West Virginia coal company reached bad roof at their low seam mine, they found that timbering lowered headroom to such an extent that equipment had to be moved at a slow pace to avoid dislodging crossbars. Soon after wood timbering was replaced with 30-inch expansion type bolts, bored and set by a RBD-30 Roof Bolting Unit, daily production jumped 70 tons per shift . . . an increase of 25%.

And the CP mobile Roof Bolting Unit takes less than 3 minutes to complete an entire roof bolting cycle! Where hole depth is less than 36" it's even faster . . . can complete the cycle in 1½ minutes flat. One motor drives both auger and bolt setter . . . the versatile chuck telescopes 6 inches to conform to roof variations. The RBD-30 is available with water swivel attachment; special low speed spindle adapter for slow speed drilling and a low seam drilling attachment for low coal areas.



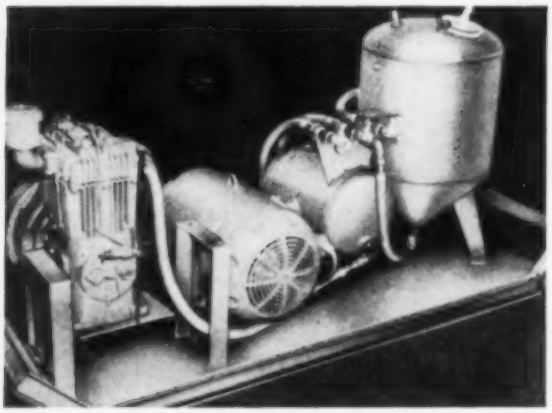




Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

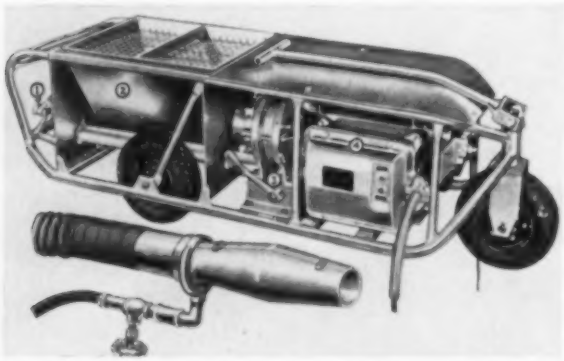
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

ground conductors where machines are equipped with Type G cable. Said to be "fail safe" by the company, the unit is provided with a test circuit which applies an artificial ground to test the "Ground-I-Cator" itself.



Wet Rock Dusting

Manson Machine Co., Taylorville, Ill., is producing a wet rock duster that eliminates dust, requires only one man and has no nozzles to adjust or valves to regulate. Distributed by the Mountain State Equipment Co., Taylorville, Ill., the duster fan-sprays a pre-mix of regular rock dust and water through a fixed nozzle. The company says that there is no spray bounce or drip off walls and ceilings and that a precise mixture of rock dust and water creates a consistency which makes the solution cling to exposed coal surfaces. Eight 50-lb bags are mixed with water during a single operation. Powered by a 10-hp motor (USBM approved), the duster's air compressor is a 2-cylinder, air-cooled quadruple V-belted unit equipped with a 51-cfm, ½-in blowdown valve set at 90 lb. Its mixing tank works at a 125-lb maximum pressure, 650-deg maximum temperature and holds 26½ gal of water. Average coverage: 1,050 sq ft. A ⅜-in plate welded to 3-in I-beam skids provide a base.



Portable Unit Dusts Wet or Dry

A high pressure portable type rock duster named the "Little Chief" has been developed by the American Mine Door Co., Canton 6, Ohio, for wet or dry dusting. The unit delivers from 35 to 60 lb of dust per minute through 50 to 400 ft of 1¾-in hose. Equipped with a wet nozzle and a water supply at 20-25 lb pressure, the "Little Chief" will deliver "on shift" dusting within the 40 ft of face area prescribed by the U. S. Bureau of Mines. Features: quick-lock cams for attaching hose; stainless steel hopper; multiple disc clutch for mechanical protection; skid or rubber-tired models; anti-friction bearings; and a tubular frame.



Bit Tipped With Harder Carbide

A continuous mining bit containing a harder grade of carbide is being produced by Carmet, the cemented carbide producing facilities of Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Carmet, which has typed the bit as the "J" style, says the tool was designed for all ripping and boring type continuous miners. Said to be more wear-resistant than previous bits, the "J" bit is expected by Carmet to have less carbide breakage than previous continuous miner bits, since its tip has been given added steel support in a new design. The tool incorporates the forged hook angle at its top, a feature designed to help removal of a bit from a continuous miner. A second feature pointed out by Carmet is a forged-in set screw notch, which the company says will help prevent lost tools. Tip design provides for a full radius on the cutting nose to increase edge strength in rough cutting.



Diesel Rated At 335 Hp

A turbodiesel engine rated at 335 hp and equipped with a newly-developed gas turbocharger is being manufactured by the Cummins Engine Co., Inc., Columbus, Ind. Designated the NRTO-6 Turbodiesel, the engine develops 335 hp at 2,100 rpm with a 90-deg intake air temperature from 0 to 4,000 ft. (For each 1,000 ft over 4,000 the NRTO-6 is de-rated 1½%.) A six-cylinder, 4-cycle unit with a bore and stroke of 5⅝ in x 6 in and a piston displacement of 743 cu in, the NRTO-6 has a compression ratio of 14.5 to 1. Turbocharging is accomplished by piping exhaust through a turbine which is an element of the turbocharger. The exhaust gas is directed against the turbine blades, whirling the turbine wheel and shaft. A centrifugal impeller mounted on the same shaft but in a separate housing draws fresh air and propels it into the intake manifold and cylinders under pressure. The NRTO-6 also operates with the Cummins PT fuel system, a system that permits the engine to

B.F.Goodrich



How tires last over 4,400 hours in rugged coal mining work

THE Carbon Fuel Company operates 40 units in its coal mining work in Kanawha County, West Virginia. Trucks haul slate, slag and other coal refuse, with loads often reaching 29 tons, over rugged mining roads. Tires take a terrific beating on a job like this.

But Carbon Fuel uses B. F. Goodrich Universal and Rock Logger tires, reports as much as 4,438 hours of service from them! Says Purchasing Agent W. M. Brackenridge, "They give us better traction and less down time."

B. F. Goodrich Universal and Rock Logger tires are specially compounded to resist rock cuts and bruises. The extra-thick tread has husky cleats that dig in and pull. And under the tread you can get the B. F. Goodrich *all-nylon* cord body. It withstands double the impact of ordinary cord materials, resists heat blowouts and flex breaks. No wonder the B. F. Goodrich *all-nylon* body outwears the tread, *can be recapped over and over!*

Why not follow the lead of mine operators all over the country and switch to B. F. Goodrich tires. See your nearby B. F. Goodrich retailer today or write *The B. F. Goodrich Co., Tire & Equipment Div., Akron 18, Ohio.*



TONS OF SLAG pour onto this truck equipped with B. F. Goodrich Rock Logger tires at Carbon Fuel Co. mine near Carbon, W. Va.



"WE PREFER the Universal tread over any other," says Roy J. Ault, Superintendent of Shasta Coal Corporation, Bicknell, Indiana.

Specify B. F. Goodrich tires when ordering new equipment

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Your B. F. Goodrich retailer is listed under Tires in the Yellow Pages of your phone book



HERE'S A MAN-SIZED JOB

This is one of six CAT* DW21s with No. 21 Scrapers which handled *one million tons of clay and rock* during a Nevada winter. Working 20 hours a day, six days a week, these machines stripped overburden at a copper pit near Kimberly. Each unit loaded 15 bank yards in one minute (push-loaded by a Caterpillar D8 Tractor), made the half-mile round-trip haul, and then dumped in 25 seconds. These fast-working yellow rigs are owned by Young & Smith Construction Co. of Salt Lake City, Utah.

Outstanding though this production record is, there is now a *new* Caterpillar DW21 (Series C) and No. 470 Scraper with LOWBOWL design which will move even *more* material in *shorter* time at *less* cost per yard. Its new four-cycle diesel engine develops 300 HP (maximum output) and has a Turbocharger which packs in air according to load, not speed, for more working horsepower and greater performance.

With LOWBOWL design, the 25-yard (heaped capacity) No. 470 Scraper can handle bigger payloads faster than ever before. The bowl is shallower, wider and longer than old-fashioned scrapers for less resistance throughout the loading cycle. In on-the-job tests, the Cat DW21 and No. 470 Scraper handled at least 20% more material than any other unit in its class.

Whether for coal or metal mining, the application of the Caterpillar DW21 and No. 470 Scraper is the same. With ample power, large capacity, and wide-footprint tubeless tires for good flotation, this big yellow team can speed production and cut costs on *your* operation. Your Caterpillar Dealer—who provides skilled service and parts you can trust—will gladly give you full details. Call him soon.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

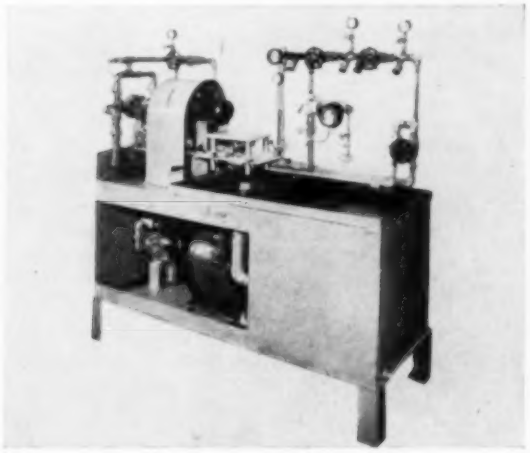
*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

function on all diesel fuel weights, although No. 2 fuel is recommended.

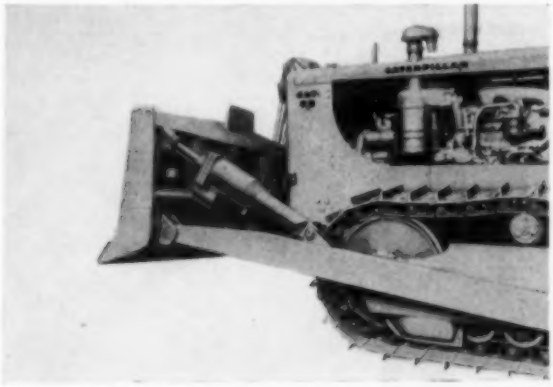
Comparison of Cummins engines (743 cu in displacement):

NRTO-6	turbocharged	335 hp	2,546 lb	7.6 lb/hp
NHRS-600	supercharged	300 hp	2,786 lb	9.3 lb/hp
NH-600	standard	200 hp	2,400 lb	12.3 lb/hp



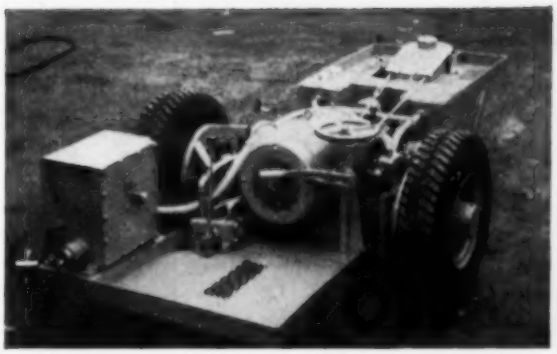
Hydraulics Test Bench

Schroeder Bros. Corp., 3116 Penn Ave., Pittsburgh 1, Pa., is manufacturing a Universal test bench (TB-25-B) designed to give users a "good shop test of all kinds of hydraulic components." Equipped with a 25-hp motor and two hydraulic circuits, the unit is being sold by Schroeder for $3,300. Its test pumps will operate in two directions or at two speeds. Maximum pressure is 1,500 psi; maximum flow is 50 gpm (either applies as limited by a 25-hp motor). Schroeder reports that one company has utilized the bench to test an electric motor.



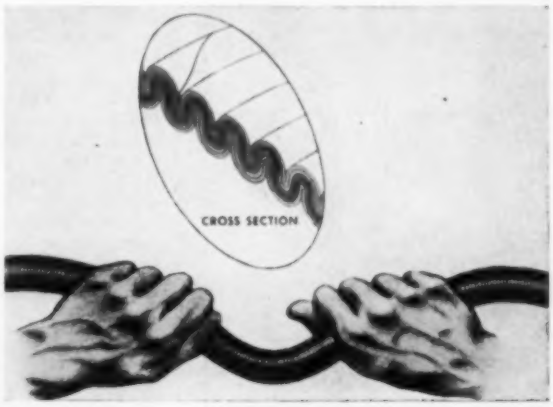
Bulldozer Tilt Attachment

A hydraulically actuated bulldozer tilting attachment for use with No. 9S and No. 8S bulldozers is being produced by the Caterpillar Tractor Co., Peoria, Ill. The attachment is designed to give D8 and D9 tractors more versatility on such jobs as ditching, hillside road-building and rock digging, applications that require frequent blade tilting. The chief feature of the attachment is a large hydraulic cylinder that replaces the bulldozer's left brace. With the right-hand brace adjusted to its neutral position, either corner of the 9S blade can be raised nearly 28 in above ground level by retracting or extending the tilt cylinder. On the 8S the blade can be raised about 24 in. Additional tilt can be obtained by extending or retracting the right-hand brace, a screw type unit.



Self-propelled Unit Powers Drill

Acme Machinery Co., Williamson, W. Va., has announced a hydraulic, self-propelled power unit designed to operate the Chicago pneumatic hydraulic coal drill. The unit is powered by a 7½ hp motor driving a gear pump delivering 20 gpm. The output of the pump, in addition to operating the drill, is diverted by a three-way valve to a tramming circuit having a four-way tramming control valve for variable forward and reverse speeds to 2½ mph. The unit is propelled by two hydraulic motors, one sprocketed to each drive wheel. Oil capacity of the hydraulic system is 28 gal. The electric motor is started by a semi-magnetic two-step starter mounted beside the operator's deck. Overall dimensions: length 97½ in; width 49 in; height 27½ in.



Tubing Easily Bent or Cut

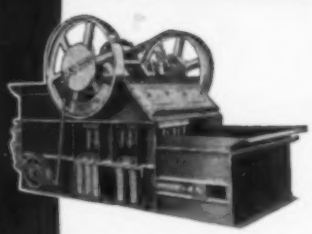
Bendable tubing that can be cut with a hacksaw or knife, can be bent by hand to stay bent, and will fit all standard connectors, is being manufactured by the Flexaust Co., 100 Park Ave., New York 17, N. Y. Named "Plica," the tubing was developed in Switzerland and has been used in Europe for the past 10 yr, as an electrical conduit. It can be made in almost any desired combination of ferrous and non-ferrous metals, fiber, paper and other materials, according to the company. Constructed in three plies, the tubing has high wall strength, is watertight and has sharp bending radii. The company points out that Plica has been made of copper, brass, aluminum, steel, asbestos, fiber and paper, and that it has been used for lubricating, coolant and other non-corrosive liquid lines, hot and cold air ducts, mechanical protection and pipe insulation. Flexaust, under exclusive rights, is manufacturing the tubing in ⅜- to 2-in inside diameters.

Medium Load Idler Series

Another Link Belt idler, the Series 50, has been added to the company's line of belt conveyor idlers. Designed for conveyors carrying medium loads or for intermittent operation, the idler

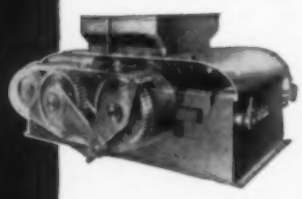
America's most complete line of CRUSHING EQUIPMENT

AVAILABLE FROM STOCK AND [illegible] DELIVERY



McNally Norton Vertical Pick Breaker

50% less fines when reducing lump to egg and stove sizes.



McNally Double Roll Gearmatic R. O. M. Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating Gearmatic drive.



McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages:
High volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher

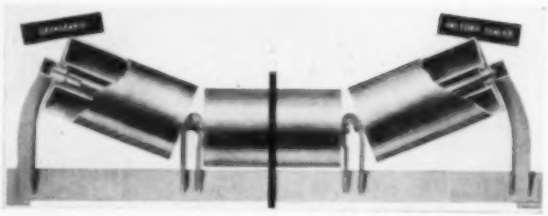
Universal application. 20", 24" and 36" dia. rolls.

For immediate action on complete information write, wire or call . . .

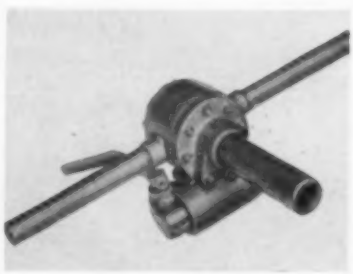
M

★ Pittsburg, Kansas ★
★ Wellston, Ohio ★

Equipment News *(Continued)*



is a self-contained unit with fully enclosed bearings. The coils consist of a smooth, uniformly thick outer shell plus a heavy-wall steel center tube brazed to dished-steel heads to form a moisture-proof integral unit. Link-Belt, Chicago, Ill., is producing the idler in two types—greasable and factory-sealed.



No Shock Coal Drill

A no-shock, no-spark, no-kick hydraulic coal drill (HD1) is being distributed by the Cleveland Rock Drill Div., Le Roi Co., Cleveland 11, Ohio. All internal parts are completely shielded from dust and the unit can be stalled under load without damage, according to the company. Since it weighs 32 lb, the drill can be held by one man, Le Roi says. The HD1 can be powered from the hydraulic system of most cutting machines, timber machines or hydraulic roof bolting machines. On equipment with lower volume pumps speed is reduced but the application has frequently been practiced, according to Le Roi.



Belt Splicing Speeded

A faster method of splicing belts with Flexco Belt Fasteners has been announced by the Flexible Steel Lacing Co., Chicago, Ill. Flexible says the speed will reduce the down time of belt conveyors. New templets now eliminate inserting fasteners from the pulley side of belts. A new boring bit and alloy steel wrench have been designed for use in standard electric or air impact tools. They are expected by the company to halve the time taken to apply fasteners by the hand method.

Brake Fade Eliminated

A sintered ferrous metal brake block, Velvetouch Feramic, which is said to eliminate brake fade to 1,200 deg is being manufactured by the S. K. Wellman Co., 200 Egbert Road, Bedford, Ohio. Made from powdered ferrous metals blended with refractory and ceramic materials, the brake block is not affected by oil or grease, solvents, moisture or temperature change. The company says that adjustments are reduced up to 87% and that drum life is increased as much as 600%.



Separation Magnet

A new line of suspended separation magnets for use with conveyor systems has been announced by Stearns Magnetic, Inc., Milwaukee, Wis. Suspended over a head pulley, or anywhere along a belt, the magnet will dig out imbedded tramp iron in a flow of material, according to Stearns. The company adds that the new separation magnet will prevent "sneak throughs."



Fights Deposits!

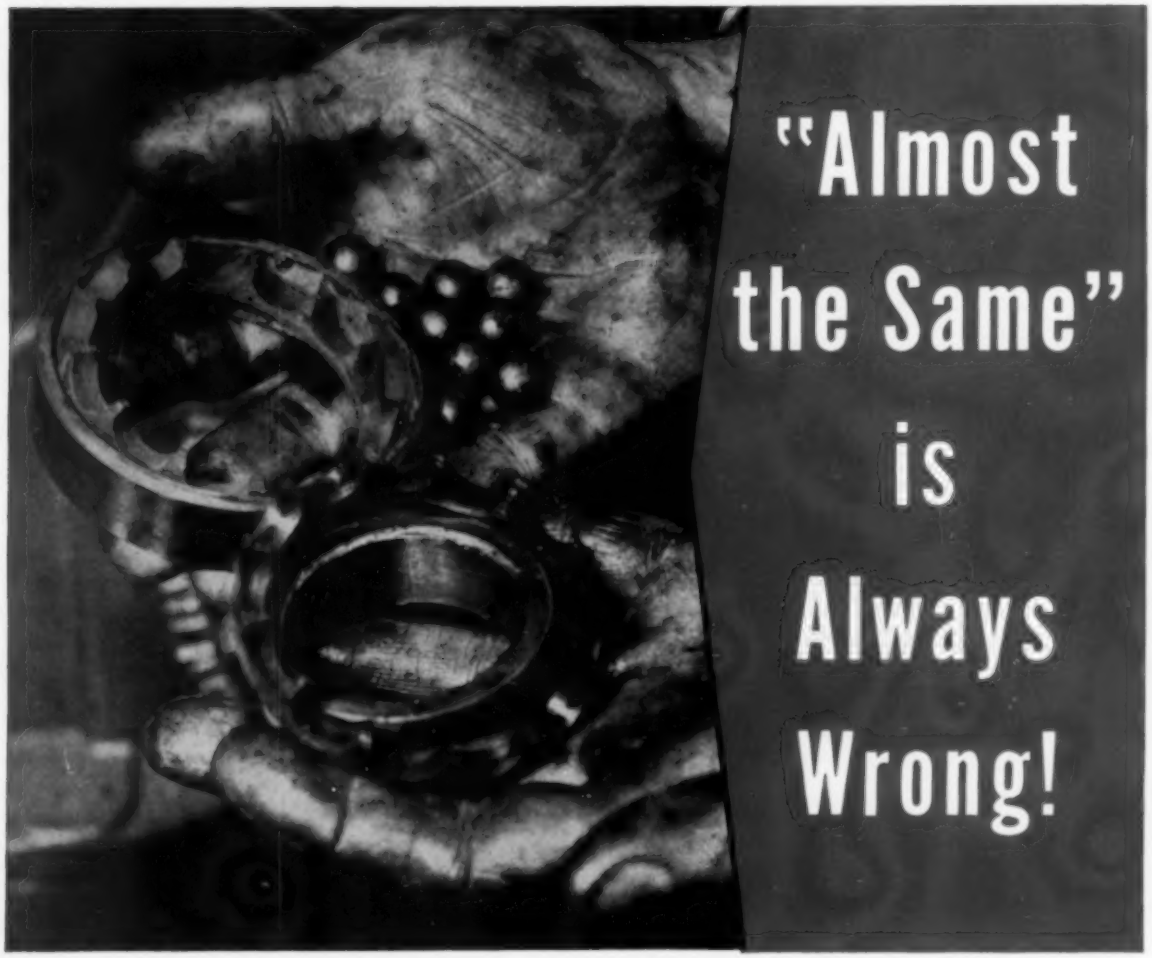
Keep out power-robbing deposits in your heavy duty Diesels. Refill with Sinclair SUPER TENOL® for the tough jobs! It helps to eliminate deposits of carbon, varnish and sludge that impair engine efficiency. SUPER TENOL is specially engineered to fight the effects of high temperature, engine over-load and continuous stop-and-go operation. Your engines last longer!

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Ground Detector

A combination ground detector and fault locator for use on normally ungrounded power circuits while the circuits are energized is being manufactured by the Parr Mfg. Corp., Cranford, N. J. Named the Model No. 58 Brunt Faultfinder, the unit is designed for use where several distribution centers of widely divergent voltages are utilized. Specifically, it is engineered to accommodate from 120 v to 600 v. The manufacturer says that a pulsating, audible signal is distinguishable over background plant noises. Parr also says the instrument's strength is great enough for it to be used in underground circuits or overhead circuits without placing an exploring coil on conduits or cables.

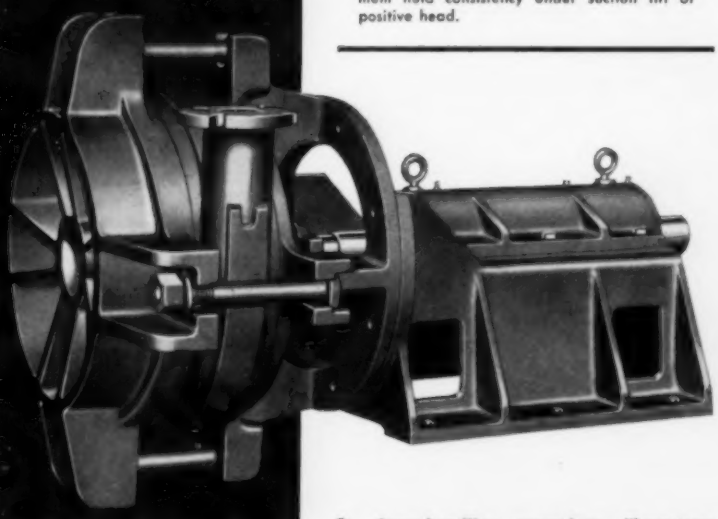


Vertical Blast Hole Drill

A heavy-duty rotary drill for vertical blast holes in mining has been announced by the Winter-Weiss Co., 2201 Blake St., Denver 5, Colo. As an addition to the company's "Portadrill" line, Model 6TA is mounted on a Caterpillar D6 prime mover and uses compressed air for removing cuttings. Two rotary compressors operating singly or together provide a maximum of 85 psi air pressure with

For Continuous Heavy-Duty Pumping

The Morris Type RX Pump shown below is a heavy-duty, low-speed all metal slurry pump expressly designed to handle abrasive slurries, chemical sludges, plant wastes etc. up to maximum fluid consistency under suction lift or positive head.



In slurry-handling operations, "long-term service" is a meaningless claim unless the pump will work day-in and day-out with a minimum of maintenance time, trouble and expense.

Morris Slurry Pumps—with an established reputation for longer life—also incorporate in their design exclusive features which result in easier installation . . . fewer interruptions to service . . . less overhaul . . . fewer replacements.

MORRIS
TYPE RX
SLURRY PUMP

• Free Service. Morris Engineers will be glad to recommend the pump best suited to your needs for size, capacity, etc. Send necessary data today . . . include request for Bulletin 185.

To Provide Uninterrupted Service...

The gland is under suction pressure only. This reduces leakage and dilution . . . keeps harsh abrasives out of the stuffing box . . . practically eliminates packing troubles.

There are no internal studs or bolts. Caustic and corrosive solutions cannot seep past threads and cause maintenance headaches.

Impeller removed without disturbing the piping. You simply loosen 4 outside clamping bolts and pull off the end cover. This feature alone saves considerable time and labor.

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CENTRIFUGAL
PUMPS

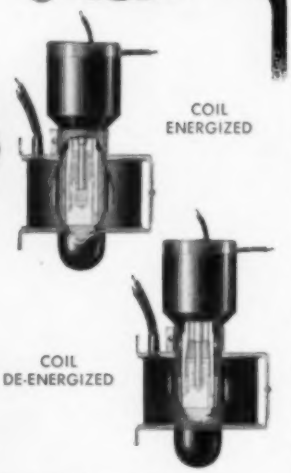
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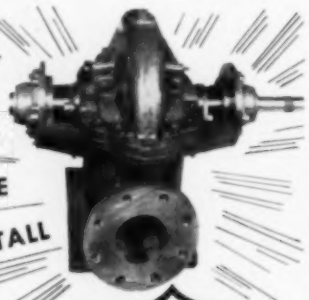
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Equipment News *(Continued)*

normal drilling pressures of 15 psi. Up to 27,000 lb of weight can be applied on the bit, and by using standard oil field roller cone rock bits the drill averages a foot or more a minute of 9-in hole in most formations, according to the company. The drill's power is supplied by the tractor engine through a heavy duty transfer case and all controls are situated in the rear where an operator can watch operations. Two men can operate the rig, one can complete shallow holes.

Dirt-Shedding Lubricant

Graphokote No. 95, a quick-drying liquid graphite lubricant that sheds dirt and dust, is being distributed by the Joseph Dixon Crucible Co., Jersey City, N. J. The company recommends the product as a dry-film lubrication for such equipment as fork lift trucks, overhead crane hot rails and contacts, conveyor belt and chain guides. Application is made with an ordinary paint brush. After drying, the lubricant forms a film over sliding surfaces.

2-Piece Reusable Couplings

Eastman Atlantic Mfg. Co., Wilmington, Del., is producing a 2-piece reusable coupling for field applications on one-wire braid cotton cover hydraulic hose. As couplings are drawn up, the hose flows into two recesses providing what Eastman called the "Inter-Lock" grip, or double grip. In addition to the "Inter-Lock" double grip feature, hex wrench pads permit tightening with ordinary wrenches.



Truck-Crane Excavator

The production of a truck crane version of the Model 305 excavator has been announced by the Koehring Co., Milwaukee, Wis. As a crane, the unit will lift loads up to 25 tons and travel at a speed of 30.2 mph, according to Koehring. All the operating and maintenance features of the 305 crawler-excavator have been retained in the truck-mounted model. For instance, upper machinery contains only two major horizontal shafts and the welded turntable is equipped with integral sidestands on which the main cross shafts revolve in anti-friction bearings. The unit is adaptable for any

an ACCO product

American Cable TRU-LAY VHS | 15% STRONGER



New VHS Dragline Lasts 73% Longer

Draglines on the excavator above, used in coal stripping operations at the Kingston Mining Company, Plymouth, Pa., get really rough service. The best Improved Plow Steel lines formerly lasted only 700 hours.

Now, however, lines of new TRU-LAY VHS are averaging 1,250 hours —giving 73% longer service life.

Records like these are being duplicated by VHS Draglines all over the country. For new VHS is tougher—more wear resistant. And it has all the advantages of preformed construction.

Your American Cable Distributor has TRU-LAY VHS *in stock now. See him or write to the nearest American Chain & Cable Company Office.*

STRONGER AND SAFER

New VHS is 15% stronger than Improved Plow Steel, which was the strongest available until now. Its additional strength enables you to handle heavier loads with the same diameter line. And it gives you a higher factor of safety during the entire service life of the rope.

FOR SHOVEL HOIST ROPES AND SLUSHER ROPES, TOO

TRU-LAY VHS was developed particularly for the toughest applications in the mining industry — draglines, shovel hoist ropes and slusher ropes. It stands up better under the rough treatment these ropes necessarily get.

LESS "DOWN TIME"—CUTS COSTS

Because it is tougher and more wear resistant, TRU-LAY VHS rope lasts longer, costs less to use and cuts "down time" of equipment for wire rope replacement.

TRU-LAY VHS ropes are easy to order. Just ask for TRU-LAY VHS Shovel Hoist Ropes, Slusher Ropes or Draglines, in the size you want. You don't need any complicated specifications.

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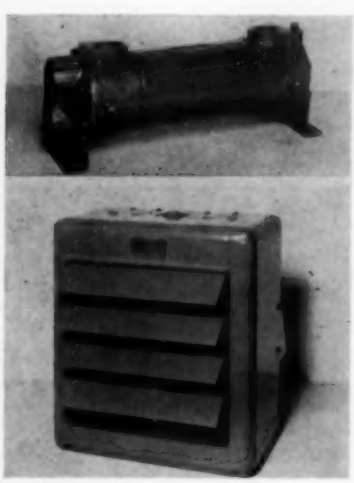
176 ABINGDON STREET, GALESBURG, ILLINOIS

Equipment News *(Continued)*

crane operation—lift, clamshell, dragline, grapple, magnet and pile-driving. For high lift crane service, the standard 30-ft main boom can be extended to 100-ft length. In addition, a jib boom can be added. The truck chassis is provided with five main and two auxiliary forward speeds. Air brakes are built into each of its four double-tired rear drive wheels.

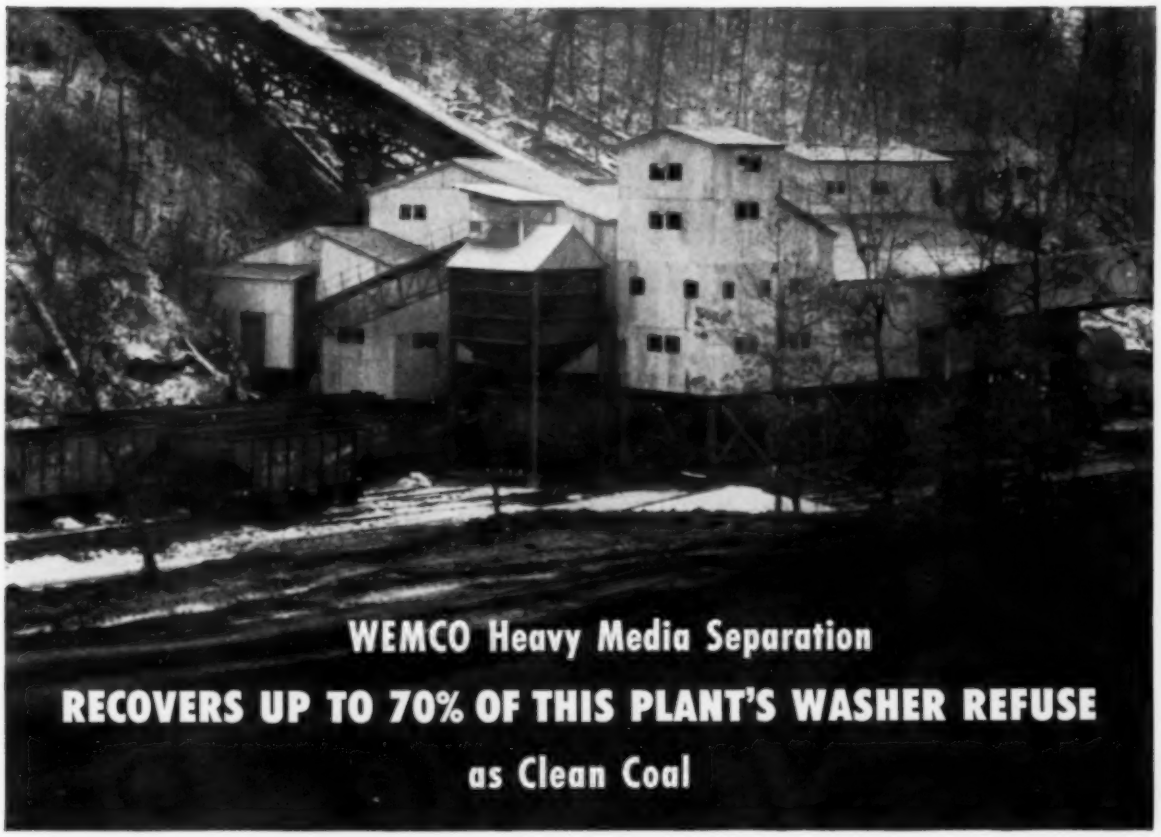
Cleaner Increases Payload

A rotary dump mine car cleaner named the Michaealson (mechanical vibrator) is being manufactured by the Valley Machine & Electric Shop, Inc., P. O. Box 169, Fairmont, W. Va. The company reports that the first machine constructed was installed at a northern West Virginia mine that dumps some 1,000, 3½ ton cars a day. At the end of the first month of operation (23 days) "a substantial increase was made in railroad weight over mine scale weight because of the increase in pay load of the mine car and decrease in tare weight." At the time, Valley Machine says, the tare weight was dropped 200 lb a car. A second machine has been in operation for two yr. Both cleaners have been observed and tested for damage to cars, but the company reports that no damage has occurred thus far.



Hydraulics Oil Coolers

Airtype and water type oil coolers for industrial hydraulic system are now being produced by Vickers, Inc., Detroit 32, Mich. Designated Series OCW, the water type coolers are available in single unit sizes for oil flows up to 100 gpm and for continuous power removals up to 37 hp (based on 85 deg entering water temperature). Recommended working pressure is 75-psi. The air type coolers, designated Series OCA, are recommended where water is at a premium and waste heat can be used to warm space. The OCA series' high heat transfer rate results from a turbulator that breaks up the flow for maximum dispersion of oil against the walls of the heat transfer tubes. The OCA coolers are available in single unit sizes

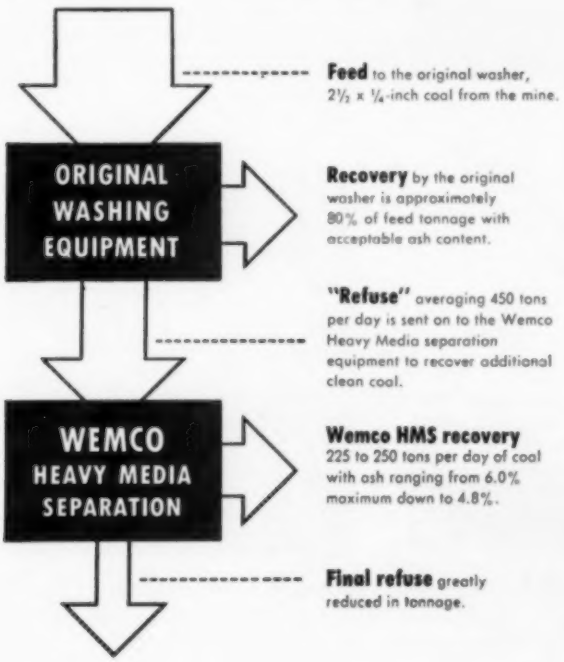


WEMCO Heavy Media Separation

RECOVERS UP TO 70% OF THIS PLANT'S WASHER REFUSE

as Clean Coal

The Jewell Ridge story at a glance



"We are now recovering 225 to 250 tons per day of clean coal that was formerly lost," says the Division Engineer at Jewell Ridge Coal Company in Tilford, Kentucky.

Lab analysis at Jewell Ridge had shown a large loss of coal in the refuse of the original washing plant. A Wemco Heavy Media plant (of Mobil-Mill design) was added to treat the large volume of refuse. It was expected to recover a coal of 11 percent ash, saleable at a low price. But in actual operation, the Wemco Heavy Media equipment has been recovering 225 to 250 tons per day of coal in a range from 4.8% ash to 6.0% maximum. (Jewell Ridge Coal Company has now ordered a second Wemco Heavy Media plant.)

A Wemco HMS Mobil-Mill can earn extra profits on your mine too. Write today for full information.

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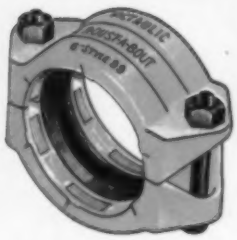


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VICTAULIC COUPLINGS
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For plain or beveled end pipe *Style 99.* Simple, quick, and strong. Best engineered and most useful plain end coupling made — takes a real "bull-dog" grip on the pipe. Sizes 2" to 8".



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Elbows, Tees, Reducers, Laterals, *a complete line*—fit all Victaulic Couplings. Easily installed — top efficiency. Sizes ¾" to 12".



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Time saving, on-the-job grooving tools. Light weight, easy to handle — operate manually or from any power drive. Sizes ¾" to 8".

PLUS FITTINGS AND GROOVING TOOLS

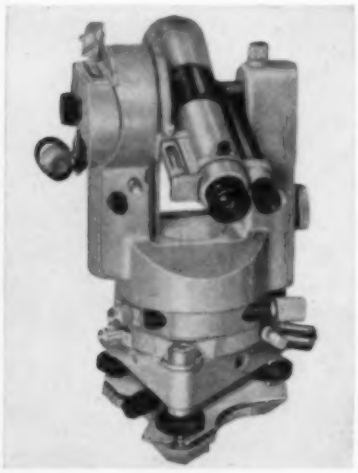
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Equipment News *(Continued)*

for oil flows up to 70 gpm and for continuous power removals up to 13.2 hp (based on 100 deg average ambient temperature). Maximum recommended oil pressure is 150 psi.



Cuts Reading Time

A new optical transit, the Geo T 50, is designed to permit an operator to obtain all readings from one position. Both circles are read through the same microscope, which, the manufacturer points out, helps prevent accidental movement of the transit by an operator. Manufactured by the Geo-Optic Co., Inc., 170 Broadway, New York 38, N. Y., the transit requires less than half the reading time of former instruments, the company declares. Equipped with a "Terrestric" telescope, the instrument also contains a built-in optical plummet. In addition, electrical illumination makes continued operation possible in darkness.



Torque Converters

National Supply Co., 2 Gateway Center, Pittsburgh, Pa., has begun manufacturing single-stage torque converters from 100 to 1,000 hp for use on mining machinery. The converters are being constructed in six basic sizes that include



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2. **DUST PROOF — ODORLESS** – Permatreated coal insures dustless delivery and handling, odorless storage and burning.
3. **REDUCE MOISTURE** – Add 300,000 BTU per ton for each 1% reduction in moisture.
4. **DECREASE WATER ABSORPTION** – Permatreated coal repels water and coal unloads twice as fast.
5. **MAINTAIN QUALITY** – Permatreat reduces deterioration from weathering.
6. **ELIMINATE WINDAGE LOSS** – that results in lost weight claims and air pollution complaints.
7. **CONTROL BULK DENSITY** – Permatreat insures uniform coke production and quality.
8. **FREEZE PROOF** – Permatreated coal resists freezing and eliminates frozen car pockets.

Coal treated with . . .

Ashland
PERMATREAT
COAL SPRAY
seals in dust

"lasts the life of the coal"

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Special Advisory Service available from nationally recognized authorities on coal treatment.

Equipment News *(Continued)*

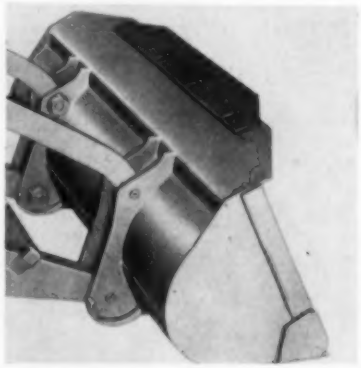
17 power capacities. The three hydraulic elements—pump, turbine and stator—are constructed of aluminum alloy castings. The 17 power capacities, provided in closely spaced ranges, are designed to match exactly engines and electric motors.

Circuit Breakers

A complete line of Cordon circuit breakers—molded case type with 100,000 amp interrupting rating—is being produced by I-T-E Circuit Breaker Co., Philadelphia, Pa. Initially made in the 225-amp frame size, the new circuit breaker is now being manufactured in 100-, 400-, and 600-amp models. The Cordon weds a current-limiting device to a standard, molded-case circuit breaker and is designed for normal branch and feeder circuit applications. Current-limiting fuses (Amp-traps) are coordinated to assume fault-clearing duty when short circuits approach a predetermined value. The breakers are available in 2- or 3-pole construction for either 250 v, DC or 600 v, AC service.

Pressure Jet Jig Bottom

Pyramid Screen Co., 181 Harvard St., Brookline 46, Boston, Mass., has announced the "Pyramid" pressure-jet jig bottom, which the company says, offers these advantages: maximum open area because of web construction; no "breathing" in the screen because of large contact surfaces; low resistance to upward, flow-retarded return flow because of jet-like openings designs; no eddy current since tapered openings guide return flows; upward and return flow whirling eliminated; minimum screen wear.

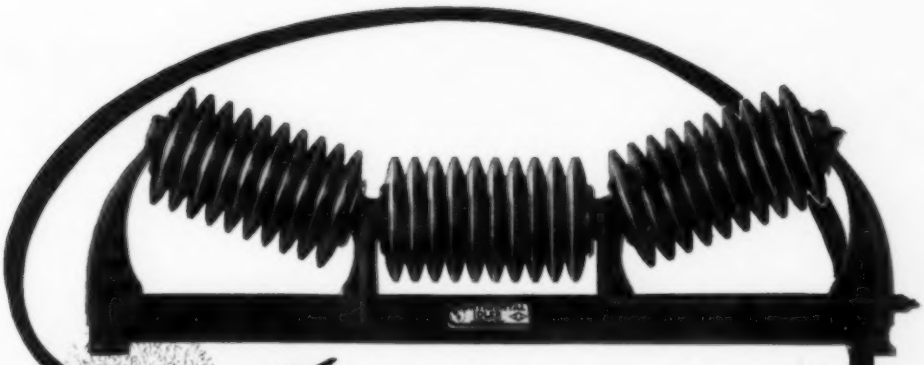


Spill Plate Attachment

A new bucket spill plate attachment for No. 977, No. 955 and No. 933 Traxcavators has been announced by Caterpillar Tractor Co., Peoria, Ill. Designed to make use of the machines' power and bucket actions, the attachment makes it possible to pick up heaped loads with-







Continental IMPACT IDLERS — the BIG Difference...



In Conveyor Belt Life

Insist on Continental Impact Idlers under the loading point of your conveyors:

1. **Absorbs greater impact**
2. **Increases belt life**
3. **Lower belt maintenance**

Here's a typical installation that is really paying off—a Continental Shuttle Conveyor handling 600 TPH at 350 FPM. Systems such as this are constantly proving the value and reliability of Continental Conveyor Equipment.

Specify CONTINENTAL CONVEYORS

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out excessive spillage, even when workings are loose material. Bolted to the top edge of the bucket, the attachment is adjustable and can be extended from 2½ to 3 in above the bucget spill plate.

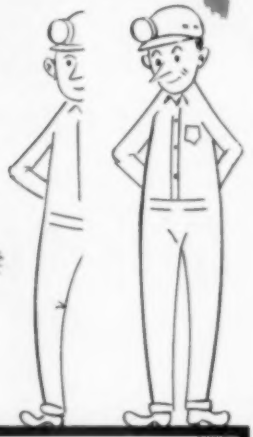
800-Amp Circuit Breaker

An 800-amp M-frame circuit breaker, the first molded case circuit breaker to be approved by the Underwriters' Laboratories for operation at 800 amp is being introduced by I-T-E Circuit Breaker Co., Philadelphia, Pa. The breaker extends the operating range of molded case breakers from 600 to 800 amp and can be utilized in panelboards, power panels, switchboards, motor controls and individual enclosures. The breaker offers optional pressure connectors for either double or triple cable connections per phase within the circuit breaker case. Double 300 to 500 mcm cable connectors are available for breakers rated at 600 amp. Triple 300 to 400 mcm or special double 600 to 750 mcm connectors are available on breakers rated at 800 amp.

Solid, Perforated Buckets

A line of dragline buckets constructed with either solid or perforated baskets is being manufactured by Bucyrus-Erie Co., South Milwaukee, Wis. Three types are available in several sizes—the BL for light digging in materials with resistance to penetration similar to gravel or clay; the BM for medium digging in bulky material, e.g. shale or cemented gravel; and the BH for heavy duty digging. The buckets are constructed with a special steel alloy named "Becoloy." Other features: a high bucket arch for wide opening and clearance; "slicing action" lip—a thin cast steel section shaped for penetration.

WHICH MINER WOULD YOU HIRE?





Naturally you would hire the whole man—even so, are you getting the most productive man hours from your section crews? . . . or are your men losing too much time traveling between the lamp house and the face? If the answer is "yes" then let us show you how you can quickly and reasonably install a speedy, safe Connellsville Automatic Man Cage nearer the face—a portable installation which can be moved to a new location, when necessary, with a minimum of time and expense. This man cage will cut travel time up to 50% per man—a big savings in time—a big boost in production when multiplied by individual crew members.

Custom-built to meet your requirements, the two-deck Connellsville Elevator-type Man Cage is fully automatic with push button controls. Installed complete with hoist, controls, counterweight and sheaves at a price lower than conventional methods and equipment.

Literature on request—write or call today.

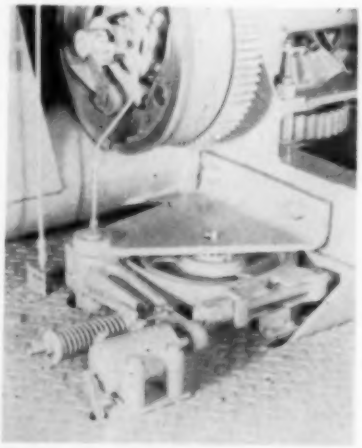
CONNELLSVILLE
MANUFACTURING & MINE SUPPLY CO.
CONNELLSVILLE, PENNSYLVANIA

"SERVING THE MINING INDUSTRY SINCE 1901"



Mobile Machine Shops

A line of Davey mobile machine shops, reportedly capable of meeting the needs of every type of user operating over extensive areas, is announced by the Davey Compressor Co., Kent, Ohio. Shop assemblies vary from relatively simple items of power equipment to vast collections of tools and accessories. Basic units are Davey air compressors and power and welding generators. These are driven directly from the truck engine through a Davey heavy duty power take-off. Shops can be mounted on practically every make and model of truck.



Shovel-Crane Swing Brake

A friction type swing brake for shovel-cranes that permits an operator to hold a boom in any desired position through finger-tip control is being manufactured by the Link-Belt Speeder Corp., Cedar Rapids, Ia. The company's full line of crawler and rubber-tired shovel-cranes—½ to 3-yd digging capacities, 12½ to 35-ton lifting capacities—are being constructed with the feature. Designed for spotting loads with precision, the brake's effort is hydraulically applied with "Speed-o-Matic" power hydraulic controls. It is spring-released.

TIMKEN® bearings help get the ore from ship to shore in a hurry



THE JEFFREY MANUFACTURING COMPANY'S heavy-duty idlers with Duoflex seal used by the Pennsylvania Railroad. Timken tapered roller bearings are on the troughing and return idlers.

THIS conveyor system is installed at the Pennsylvania Railroad's ore-unloading pier in Philadelphia. It handles up to 3,300 tons of ore per hour on each of two 54" belts traveling at more than 500 feet per minute. Timken® tapered roller bearings were selected for the Jeffrey troughing and return idlers used throughout the entire system.

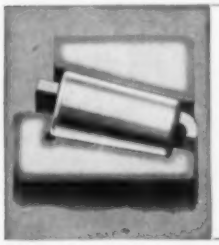
Timken bearings are the only tapered roller bearings proved by 25 years or more of service in heavy-duty conveyor installations using the popular dead shaft construction. Line contact between rollers and races gives Timken bearings high load capacity. And by using Timken bearing sizes that are mass produced for the automotive industry, you get extra capacity bearings that actually cost you *less* than the smaller sizes you'd normally use.

You get longer roller and belt life with Timken bearings because their true rolling motion and extremely smooth surface finish mean less friction. Result: less sliding and scuffing between idlers and belt.

When it comes to buying or building any kind of machine, your best bet is Timken bearings. We do everything possible to make sure they give you full value. In fact we even make our own steel. We're the only bearing manufacturer in the country who does. Make sure the bearings in your machinery are stamped with the trademark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

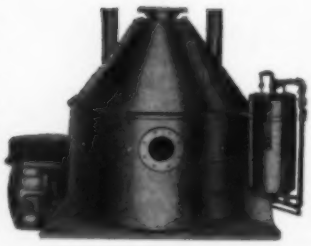
TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ⟊ AND THRUST —⟊— LOADS OR ANY COMBINATION ✳



FOR DRYING COAL THE ECONOMICAL WAY

. . . your best buy is C·M·I. Through 40 years of experience, C·M·I has developed a dryer that provides an actual saving of 24% in horsepower over other comparable units. This new, improved centrifugal dryer offers you smoother, more dependable performance in addition to drastically reduced operating and maintenance costs.

If you are searching for an economical answer to that expensive heat-drying problem, write C·M·I for particulars.

C·M·I

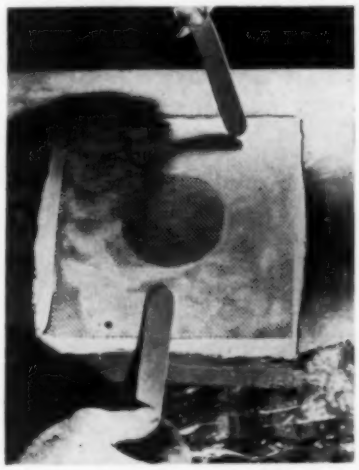
CONTINUOUS CENTRIFUGALS

Reap additional profits with efficient slurry recovery.

C·M·I Centrifugal DRYERS

CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.
146 PRESIDENT ST.
ST. LOUIS 18, MO.

Equipment News *(Continued)*



Cold Patching Metal

A method of making metal tank, pipe and conduit repairs without welding has been devised by the Smooth-on Mfg. Co., Jersey City 4, N. J. By using a newly-developed filled epoxy resin material (Sonite) and a glass cloth, the company has prepared patches that test up to 1,000 psi without failure. Oil-proof and waterproof, Sonite will resist acids and alkalis, according to the manufacturer. In application a primer is brushed on to the broken area, then the glass cloth is placed over it. Next, Sonite is painted over the cloth, after which a second patch is placed over the first and the painting operation repeated. Three or four patches are recommended for large tanks, two for a small tank or pipe.



Multiple Tube Collector

A mechanical collector of the multiple tube type that incorporates new design principles to increase gas handling capacity has been developed by Research-Cottrell, Inc., Bound Brook, N. J. Traded as the "Cyclo-trell," the design is said to have a higher collection efficiency and a greater gas flow for a given pressure drop than usual multiple tube collectors. The "Cyclo-trell" consists of a series of cyclone tubes arranged in parallel and depends on centrifugal force to operate. Incoming gas enters a chamber under pressure and flows into a lower set of inlet tubes attached to the lower header plate. Inlet vanes set up a circular motion in the gas forcing suspended particles down and out against the wall of the inlet tube. Cleaned gas is first forced toward the center of the collector tube and then upward into the outlet tube by the pressure differential.



High Pressure Oil Gun

A hand-operated high-pressure oil gun for contacting standard lubrication fittings has been announced by Lincoln Engineering Co., 5729 Natural Bridge Ave., St. Louis 20, Mo. With the unit positive pressure lubrication with oils is possible as well as flushing and cleaning bearings that require periodic applications of fluid lubricant. Used with the pressure gun are metal rings anodized in several colors. Slipped over the head of each fitting to provide a color coding system for bearings requiring oil, the rings simplify standardization and help prevent the accidental use of a grease gun.

Equipment Shorts

REBORABLE COUPLINGS – Browning Mfg. Co., Maysville, Ky., has added a complete line of minimum bore type (reborable) chain couplings to its line of rigid, flexible and chain couplings. The minimum bore couplings are manufactured with solid steel sprockets and hardened teeth and are fitted with hollow head set screws.

THEODOLITE – For preliminary and smaller survey work Wild Heerbrugg Instruments, Inc., Main & Covert Sts., Port Washington, N. Y., is producing the Wild T-12, a lightweight, miniature size instrument (3x8 in, 7 lb). The T-12 presents an upright image, 5X magnification and an 8-deg field of view. Tripod, container and plumb-bob are included in the $245 price.

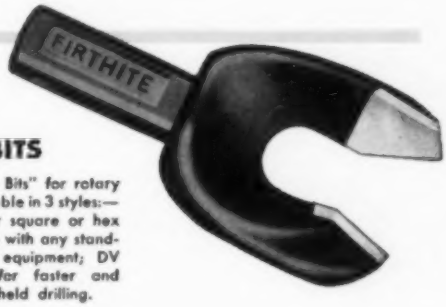
SENSING DEVICES—Automatic sensing devices that indicate a lack of material supply or flow in a handling operation are being manufactured by Richardson

Delivery from Stock in every mining area...



ROOF BITS

Firthite "Blue Bits" for roof drilling are made in 3 styles: RDL for light uses and very soft roof rocks; RDH with extra heavy duty insert to resist gage wear for most difficult roof drilling; RDS (slotted) for faster drilling of medium to hard roofs. All are water channeled for either wet or dry work.



DRILL BITS

Firthite "Blue Bits" for rotary drilling available in 3 styles:—D with either square or hex shank for use with any standard drilling equipment; DV (illustrated) for faster and easier hand held drilling.



MACHINE BITS

Firthite "Blue Bits" for mining machines include bit design, style and grade for every need from light to rugged condition on continuous mining equipment.

FIRTHITE

"BLUE BIT"

MINING TOOLS

Firth Sterling

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Alabama	
Birmingham	A. A. Culp
Colorado	
Denver	Union Supply Company
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Evansville	Austin Powder Company
Kentucky	
Harlan	McComb Supply Company
Madisonville	Austin Powder Company
New Mexico	
Carlsbad	Carlsbad Supply Company
Ohio	
Cleveland	Austin Powder Company
Weirton	Weirton Ice & Coal Supply
Zanesville	Dunlap Welding & Supply
Pennsylvania	
Johnstown	Mole-Bits Company
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Scranton	Carl B. Lewis
Waynesburg	Austin Powder Company
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Clarksburg	Austin Powder Company
Logan	Guyan Machinery
Wheeling	Service Supply Co.



FINGER BITS

Firthite "Blue Bits" for use in standard drill heads feature two-surface brazing with tips set in recesses for greater strength. Available in all popular sizes.



Mr. Tooley says—

"Firthite 'Blue Bits' are better because Firth Sterling makes *both* steels and carbides. Tool steel shanks and Firthite Carbide inserts are perfectly matched by one manufacturing source for maximum quality."

R-309R3

Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

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High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

Equipment Shorts *(Continued)*

Scale Co., Clifton, N. J. The devices warn (bell, horn, light) when a lack of material, or flow, is detected in chutes, conveyors, bins and hoppers. Three models are available: material level control; blade no-flow alarm; and paddle no-flow alarm.

MOTOR-DRIVEN PUMPS – Blackhawk Mfg. Co., Milwaukee 46, Wis., is producing the "Porto-Power" motor-driven pump for continuous or intermittent operation of any Porto-Power ram or any hydraulic system requiring up to 10,000 psi. Motor, pump, valve and oil reservoir are under one hood.

Free Bulletins

DC MOTORS, GENERATORS–Bulletin GEA-6355 describes "Kinamatic" DC motors built to new NEMA standards. Information on electrical and mechanical features, maintenance and ratings (1-150 hp) is included. Bulletin GEA-6461 contains information on "Kinamatic" generators, ¾ to 100 kw. General Electric Co., Schenectady, N. Y.

WELDING PROCEDURE – A 140-p pocket book (TIS 2575) featuring welding procedures for every base metal is available from Technical Information Service, Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing 58, N. Y. Covered are 120 welding rods, electrodes and welding compounds. How-to-weld information is given for fabrication, maintenance repair and salvage, overlaying and welding dirty or rusty parts.

SCREEN HEATING – "Hanco" electric screen heaters are explained with diagrams and text in a 3-p folder published by the maker, F. R. Mannon & Sons, 1605 Waynesburg Rd., S.E., Canton 7, Ohio. Bulletin 756.

DOCK CONSTRUCTION – De Long Corp., 29 Broadway, New York, N. Y., describes De Long jacks and technique of dock construction. The company constructed the Texas tower and Consolidated Edison's coal dock in New York's East River.

PUMPS–Dean Bros Pumps, 323 W. 10th St., Indianapolis, Ind., is offering Bulletins 184 and 189 describing the company's line of standard centrifugal process pumps (No. 184) and mechanical stuffing box sealing (No. 189).

CRAWLER TRACTORS – International Harvester is distributing information on diesel crawler tractors in 8-p, two-color folders. The company's TD-6 is described in booklet CR-491-F; its TD-9 is described in Booklet CR-490-T; the TD-14 in Booklet CR-489-F; and the TD-18 in Booklet CR-488-F. 180 North Michigan Ave., Chicago 1, Ill.

WORM GEARING – The "ABC's of Speed and Cost Reduction–by Cleveland" contains case histories of Cleveland Worm & Gear's worm gearing sold during the last three decades. Costs are discussed and standard models of the Cleveland line are illustrated. 3249-59 East 80th St., Cleveland 4, Ohio.

STEEL FRAME BUILDINGS – A 6-p folder from Armco Drainage & Metal Products, Inc., Middletown, Ohio, tells how to solve big building problems with rigid frame type steel buildings–from 1,600 sq ft up. Descriptions and specifications.

ROLLER CHAIN, SPROCKETS – The complete line of Link-Belt roller chain and sprockets is described in a 148-p book (No. 2457) being distributed by the company from Dept. PR, Prudential Plaza, Chicago 1, Ill. The book includes sections on stock drives, drive chain, conveyor chain, installation and maintenance, lubrication, sprocket wheels, casings and chain tighteners.

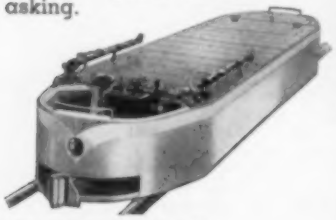
LUBRICATION, COOLANT SYSTEMS –Custom designed Dravo-DeLaval lubrication systems are contained in Bulletin 1450 being distributed by the Dravo

YOU'LL DO BETTER *with* DIFFERENTIAL

THE COMPLETE MINE HAULAGE SYSTEM

Examine the facts and, chances are, you'll specify Differential.

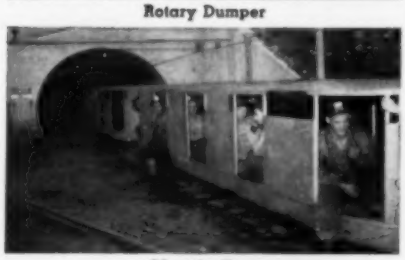
Every type of mine hauling equipment — locomotives, mine cars, rotary dumpers, mine supply cars, air dump cars, rock larries, ballast cars, mantrip cars — can be supplied. Our engineering and sales counsel are available to you without charge — yours for the asking.



Only Differential offers the complete mine haulage system.



Rotary Dumper



Mantrip Cars



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Large-Capacity Mine Cars

DIFFERENTIAL STEEL CAR COMPANY FINDLAY, OHIO

SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT

PYROPRENE* BELTING
GIVES YOU
LOWEST COST PER TON
PLUS FIRE RESISTANT* PROTECTION

FIRE RESISTANT*
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Tell us your conveyor problems! We welcome the opportunity of proving that Hamilton PYROPRENE* will lower your costs and provide fire resistant* protection.

Write, wire or phone for more details of Hamilton service. Ask for a copy of our 1956 catalog.

*Acceptance designation: "FIRE RESISTANT, U.S.B.M. No. 28-7" Jan 27, 1956

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"POSITIVE COAL DEWATERING"



Every 24 hours . . . the American* Disc Type Filter . . . at Joanne Coal Company, Rachel, West Virginia . . . recovers $3,153 of fine, clean metallurgical coal usually discarded as waste or recovered by more expensive methods.

Using only eleven of its twelve discs, this American Filter is dewatering 45.7 TPH or approximately 90 lbs/ft2/hr. with an average cake ash of only 10%.

Other advantages of this economical operation include longer cloth life on filter bags and positive recovery of the filtrate which contains less than 1.0% solids for reuse in the washery system.

If you have a problem in the recovery of fine coal, chances are a D-O Engineer can be of help to you; or if you would like descriptive literature, write Dorr-Oliver Incorporated, Barry Place, Stamford, Connecticut for Bulletins 218-R, 600 and 2200.

*T.M. Reg. U.S. Pat. Off.

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STAMFORD · CONNECTICUT · U.S.A.

Bulletins *(Continued)*

Corp., Industrial Dept., 5th & Liberty Ave., Pittsburgh 22, Pa. Also described are the company's Unilube units, or packaged lubrication systems.

SLUDGE CLEANING – How to clean sludge out of hydraulic and lubrication systems without shutting down machines is told in Sun Oil Co.'s Bulletin 44, "Sunvis 700 Oils." The bulletin also tells how continued use of detergent oils keeps equipment clean. Sun Oil Co., Philadelphia 3, Pa.

POWER-TAKEOFFS – Horsepower and torque capacities, side pull limitations and dimensions of all Twin Disc power take-off clutches are contained in Bulletin 30 being distributed by the Twin Disc Clutch Co., Racine, Wis. Included is information on the SP type take-offs designed for high-speed, high-output industrial engines.

BELT IDLER–The Joy "Limberoller" belt idler is described and illustrated in a 12-p booklet (No. 2-1) being offered by the Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. Suggested applications are included.

V-BELT TIPS–Trouble-saving tips are the subjects of No. 2 and No. 3 mailers being distributed by the Worthington Corp., Promotion Dept., Harrison, N. J. The mailers cover V-belt drives, sheaves, belts and motors. Included is advice on how to detect failures and how to correct them.

WELDING PRODUCTS–Bulletin 3-56-1M, distributed by the Taylor-Wharton Div., Harsco Corp., High Bridge, N. J., contains prices and stock sizes of Tisco "Timan" manganese-nickel-steel-welding products, including rods, hot-rolled plates, special shapes, wedge bars, tooth reporters and applicator bars.

VIBRATORY EQUIPMENT–Eriez Mfg. Co., Erie, Pa., is offering folder VB-1 describing electro-permanent magnetic vibratory equipment. The line is named the HI-VI and consists of feeders to feed bulk materials at controlled speeds and unit (bin) vibrators to speed materials flows.

INDUSTRIAL ENGINES–A brochure describing the 1956 line of "Jeep" four-cylinder industrial engines and power units has been published by Willys Motors, Inc., Industrial Engine Dept., Toledo, Ohio. L-head and F-head models are described as are special features, e.g. crankcase ventilation.

EXPLOSIVES–American Cyanamid, Explosives Dept., 30 Rockefeller Plaza, New York 20, N. Y., has compiled a reference bulletin listing permissible explosives for all shooting conditions. Included is a description of the company's water resistance test in which explosives are im-



AMOCO HDX TAKES THE RAP as tonnage goes to market. Every rope tug, boom thrust and drawbar pull piles up concentrated pressures on the bearings, rings and cylinder walls of the engines that do the work. Summer dust and high temperatures make the job tougher.

That's where Amoco HDX Motor Oil wins glory. Amoco HDX provides a tough, full-lubricating protective film that stands off heavy pressure and high temperature to keep diesels or gasoline power units running happy. Its high detergent, non-gumming, non-corrosive lubrication guards them against frequent overhauls, even on hot summer service.

The result to you is top performance with money saved. Call on your nearest Amoco man for complete information about HDX and other fine Amoco lubricants for coal industry service. *American Oil Company, New York*

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LUBRICANTS

AMOCO

Sure—safe—for mine machinery

THE LAST WORD IN SCREENING EFFICIENCY



The word's out on wedge wire and *Hendrick has it!*

That's right. With the addition of new Hendrick Wedge Wire, Hendrick now makes available a complete line of screens for the best in efficient, low-cost screening, dewatering and filtering operations. It's ideal wherever it is important that screen openings be minutely fine, have excellent draining qualities and a high degree of accuracy and rigidity. For details on how Hendrick Wedge Wire can best be applied to your specific requirements and afford tops in low-cost, efficient screening, call your nearby Hendrick Sales Engineer. He's listed in your local classified telephone directory under *Perforated Metals.*

SEE OUR CATALOG IN SWEET'S

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Perforated Metal • Perforated Metal Screens • Wedge-Slot and Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids • Hendrick Hydro-Dehazer

Locate the trouble quickly — easily in your hydraulic system

Schroeder Portable Hydraulic Circuit Tester



The new Schroeder Hydraulic Circuit Tester speedily checks the operating efficiency of your hydraulic circuit components.

Weighing only 19 pounds it is housed in a convenient, sturdy carrying case, size 7" x 11" x 8¾" and can be carried without effort to the machine location. After the proper connections are simply made, by rubber hose, the tester simultaneously measures the temperature, pressure and flow from the component port under test. The unit has a pressure range of 300 to 2000 PSI and a maximum flow of 50 GPM.

Check out your hydraulic system's operation—order a Schroeder Portable Hydraulic Circuit Tester today — literature and prices on request.

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HYDRAULIC, ELECTRIC AND PNEUMATIC EQUIPMENT
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Bulletins *(Continued)*

mersed in water and fired. The test shows sound intensity which indicates the degree of water deterioration.

SCRAPERS—Euclid Div., General Motors, Cleveland 17, Ohio, has published three catalogs describing the overhung engine line of "Euc" scraper models S-7, S-12 and S-18. Catalog 505 covers the S-7 scraper (7 cu yd struck); catalog 506 covers the S-12 (12 cu yd); catalog 507 covers the S-18 (18 cu yd).

POWER TRANSMISSION—A 328-p catalog, the D56, describing Dodge mechanical power transmission products is being published for key personnel by the Dodge Mfg. Corp., Mishawaka, Ind. The catalog contains sectional drawings, dimensions, weights, prices, application details and engineering tables. An 8-p index is included.

EXPLOSION-PROOF MOTORS—Bulletin GEA-6341, being distributed by General Electric Co., Schenectady 5, N. Y., contains design features and maintenance of Tri-Clad 55 explosion-proof, induction motors, one to 30 hp.

AIR HOSE FITTINGS—The Le-Hi Div., Hose Accessories Co., 2700 North 17th St., Philadelphia 32, Pa., has announced Bulletin 110 which describes Le-Hi air hose fittings for mining.

DUST-TIGHT ENCLOSURES—Allis-Chalmers Mfg. Co., Industries Group, Milwaukee 1, Wis., has published Bulletin 07B8423 on dust-tight enclosures for floor-mounted vibrating screens (Model AVS and Model S). The enclosures have hinged top covers and since they do not vibrate can be rigidly connected.

PLASTIC PIPE—Two types of unplasticized polyvinyl chloride pipe and fittings are the subjects of a bulletin being distributed by the Alloy Tube Div., Carpenter Steel Co., Union, N. J. One type is a normal impact grade, the other is a high impact grade. Descriptions, applications and corrosion resistances.

SHELVING TIPS—Tips on how to plan installations and order shelving in more than 1,000 combinations are summarized in a catalog published by the Hallowell Div., Standard Pressed Steel Co., Jenkintown, Pa.

WELDING—Lincoln Electric Co., Cleveland 17, Ohio, has revised its "Weldirector for Mild Steel & Low-Alloy High-Tensile Steels" (SB-1351) to include iron power and other electrodes. The bulletin gives a description of each electrode, its physical properties and chemical composition.

ROAD MAINTENANCE—Leaflet CoB-4, "Calcium Chloride for Strip Mine Haulage Roads," describes the uses of calcium chloride and gives instructions for proper use. Calcium Chloride Institute, 909 Ring Bldg., Washington, D. C.



Cutting costs is the primary function of portable conveyors

To make the greatest cost savings, portable conveyors must:

. . . have quality construction for long life and trouble-free operation. They must be available in the length and capacity range to suit your needs. They must be available with the features and accessories you want—screens, power hoists, pneumatic or steel wheels, gas or electric drives, etc.

They must be easy to move around the yard . . . easily towed from job to job. They must withstand constant use and frequent movement.

Shown above is the portable conveyor of advanced design, the Barber-Greene 363. Shaft and gear reducer drive—no chains—no sprockets, full swiveling wheels, Acme take-ups and many other exclusive features.

Shown below are other models in Barber-Greene's complete line of cost-cutting conveyors.



Model 374 cuts cost at high capacity. With capacities up to 425 t.p.h., this heavy-duty machine has antifriction bearings, shaft and gearbox drive, hydraulic boom hoist and other features.



Model 358 cuts cost of car unloading. Feeding a conveyor, this car unloader releases cranes and other expensive equipment for other work. Handles gravel, sand, stone, cinders, etc.



Model 362—low-cost, high-quality portable. Three-roll carriers, swivel wheel truck, and many other features not available on conveyors of this low-price range, are standard on the 362.

56-8-PO

Write for literature on any portable in the Barber-Greene line.



Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

Announcing—





Look—exclusive

SAFETY *STEEL* SHIELD*

Right here, between tread and Super Royalon body, are thousands of cords of flexible *steel*. They form a Safety Shield invulnerable to ruptures and cuts in the vital tread area—not only for original tread life but for extra recap life as well!

NEW

U.S. ROYAL



Additional Engineering Advances that save you money in the new Super Fleetmaster

- ★ New Cross-Braced Grooves—arrest cut growth
- ★ New Tri-Rib Tread—for increased stability, easier handling
- ★ New Multi-Edged Design—gives greater highway skid control
- ★ New, Deeper Shoulder Vents—dispel heat for cooler running
- ★ New Chemi-Balanced Tread Compound—resists cutting, chipping
- ★ New Wide-Angle Grooves—actually roll away from stones

AN ALL-NEW, ALL-WHEEL ON-AND-OFF-THE-ROAD TIRE

Invulnerable

to cuts and ruptures in the vital tread area!

You are looking at an entirely new kind of truck tire—the new U. S. Royal Super Fleetmaster. Its exclusive Safety Steel Shield makes it so immune to road hazards that it runs over spikes and razor-sharp axblades without losing a pound of air!

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Mount this great new tire on dump trucks, transit mixers, log haulers...on any wheel exposed to heavy impacts, sharp objects, murderous terrain. You'll enjoy fewer tire failures, less downtime expense and greater service dependability.

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NEWS ROUND-UP



EXPORT COOPERATORS—R. E. Salvati (left), president, Island Creek Coal Co.; John L. Lewis, president, United Mine Workers of America; Walter J. Tuohy, president, Chesapeake & Ohio Ry.; and Richard L. Bowditch, chairman of the board, C. H. Sprague & Sons., and also chairman of the board American Coal Shipping, Inc.

Coal, Rails, UMWA Unite for Export

American Coal Shipping, Inc., filed incorporation papers June 11, 1956, in the District of Columbia, marking the formation of a body to control overseas freight rates and promote the U. S. export coal trade. Unprecedented in coal's history, the action is said to be the first time that producing and exporting companies, the UMWA and the principal coal carrying railways have banded together "on equal terms" in a joint merchandising venture.

Walter J. Tuohy, president, Chesapeake & Ohio Ry., made the announcement in a talk, "Coal's Vital Place in World Prosperity and Peace," presented before the meeting of Exporters Association of the United States, Inc., National Coal Association Convention in Washington, D. C., June 13. Joseph E. Moody, president of the Southern Coal Producers Association and secretary-treasurer of the new shipping agency, is generally credited with initiating and spark-plugging the effort which led to its formation.

The new corporation, capitalized at $50 million, has already approved a resolution to file an application with the U. S. Maritime Commission for the charter of 25 to 50 Liberty ships from the "mothball fleet." The ships will operate under the American flag and will be manned by American crews.

Chartering the initial group of Liberty ships will be the first step in ACS's long-range program to insure that the apparently permanent 38 million ton annual coal export market (*Coal Age*, March, 1956, p 54) will not be jeopardized by higher ocean freight costs. During the past year, the basic individual charter rate from Norfolk to Rotterdam has jumped $3.25 to about $11. And customer resistance to high delivered prices —while not yet widespread—has shown some stiffening (*Coal Age*, June, 1956, p 54).

Chartering Liberty ships will ultimately be supplemented, ACS plans, by making arrangements to build new ships for the export coal trade. Several U. S. shipping companies have reportedly shown interest in such arrangements. It is possible, also, that foreign ship-building concerns will be surveyed for proposals.

While the Libertys offer the only immediate reserve shipping space, it is felt that new ships of 20,000- to 25,000-ton capacity will ultimately be more desirable. In addition to having less than a 10,000-ton capacity, the Libertys are slow and are relatively expensive to operate. Based on USMC estimates, the operating costs of a Liberty between Norfolk and Rotterdam (including an American crew) should run from $6.50 to $7.50 per ton. Adding a "fair return" to this basic rate, ACS hopes to achieve a total rate falling somewhere between $8 and $9, as compared to the present $11 rate.

All Libertys taken out of the "mothball fleet" require reconditioning costing up to $150,000 each. Because the ACS shipping venture is industry-wide and in the national interest, the ACS figures there is a fair chance that the USMC will pick up the bill for such "break-out" costs. If not, the new shipping agency will be faced with its first major problem.

It has not yet been decided if the Libertys will be operated directly by ACS or leased to U. S. shipping companies on a contract basis which would, in effect, give ACS control over rates. But this decision, according to Mr. Moody

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Beat a power shovel wherever exclusive Drott *triple-power, pry-action break-out* is decisive—and where quick International crawler mobility can outspeed and "out-reach" a boom. Break-out force of the three Four-In-One models as Skid-Shovels ranges from 12,800 to 55,000 lbs!



Gain a 30-inch (or greater) dumping height advantage over ordinary roll-forward bucket dumping—by using the bottom-dump feature of the Four-In-One as a clamshell. And loading with the clamshell action, get a super-fast bucket-fill on stockpiled materials, even in cramped quarters.



Get versatile carry-type scraper action with the Four-In-One in Bullclam position. Using positive clam lip control, spread materials, strip, and grade with amazing accuracy. And as a Bullclam, the Four-In-One *heap-loads* itself with speedy, earth-boiling action!



Get big dozing capacity with finger-tip ease with your Four-In-One in bulldozer position. Regulate dozing depth by hydraulic "radius control" of blade pitch. Note the frost-breaking, earth-moving action. Shown here is new 2¼-yard Four-In-One for the International TD-14.



Prove Four-In-One versatility unlimited with the 1-yard TD-6, the 1½-yard TD-9, or the new 2¼-yard TD-14 model. Test *exclusive* pry-over-shoe break-out action, and *exclusive* shock-swallowing Hydro-Spring. Ask your International Drott distributor for a Four-In-One demonstration.

International Harvester Company, Chicago 1, Illinois

INTERNATIONAL® DROTT

will be made at the corporation's next meeting, scheduled for an early date in July.

Mr. Moody also says that a three-man committee has been appointed "to search for presidential timber" to head up the new agency. The committee members are A. R. Matthews, president, Pocahontas Fuel Co., Inc.; John L. Lewis, president, UMWA; and Walter J. Tuohy, president, Chesapeake & Ohio Ry.

Pending the appointment of a president, a three-man executive committee will be named to work with the chairman of the board of the corporation in setting up and managing its business affairs. The board chairman is Richard L. Bowditch, chairman, C. H. Sprague & Sons Co.

In addition to Mr. Bowditch, other ACS directors initially named are: R. H. Knode, chairman, The General Coal Co.; George H. Love, president, The Pittsburgh Consolidation Coal Co.; Evan Massey, president, A. T. Massey Coal Co., Inc.; A. R. Matthews, president, Pocahontas Fuel Co., Inc.; John S. Routh, chairman, Routh Export Coal Corp.; Raymond E. Salvati, president, Island Creek Coal Co.; John L. Lewis, president, UMWA; Thomas Kennedy, vice president, UMWA; Robert H. Smith, president, Norfolk & Western Ry.; and Walter J. Tuohy, president, Chesapeake & Ohio Ry.

The new shipping agency is incorporated to sell 500,000 shares of common



CORPORATE SEAL of American Coal Shipping, Inc.

stock at a par value of $100 a share to the participating coal groups—producing and exporting companies, railroads and the UMWA. Each of the groups has paid in an undisclosed amount as an initial stock subscription. Other ACS members are expected to join the undertaking after meetings of their boards of directors have passed on authorization.

ACS will operate as a profit-making corporation. Stock subscribers will be limited to present ACS membership. No outside sales will be permitted until ACS has forfeited its option to redeem stock 6 mo after the redemption offering has been made. The official address of the corporation is 1625 K St. N.W., Washington, D. C.

In announcing the formation of American Coal Shipping, Inc., Mr. Tuohy said that the "new corporation will promote the export coal trade on the broadest possible basis. Its first proposal is to enter immediately into the ocean shipping business by acquiring ships of its own and placing them in the export coal trade. Other plans will follow, directed toward additional problems in the international movement of American coal.

"This is an historic moment in the coal industry. We stand as a cohesive group—the coal producers, the miners' union, the exporters and the railroads. Our unity is assurance to the free nations that coal, America's greatest and most abundant natural resource, will find its vital role in world prosperity and peace."

Preparation Facilities

Jamison Coal & Coke Co., Loveridge mine, Fairview, W. Va.—Contract closed with Fairmont Machinery Co. for a coal preparation plant consisting of a trip feeder, track scales, two-car rotary dump, vibrating feeders, scalping screens, Rockmaster crusher, 54-in wide feeder belt and 48-in wide x 3,100-ft center slope belt conveyor. A 400-ton rock and refuse bin will be situated at the discharge end of the slope belt conveyor. Capacity from dump to stockpile, 1,500 tph; capacity from stockpile through washing plant, 1,200 tph. Probable completion date, January, 1958.

Carbon Fuel Co., Winifred, W. Va.—Contract closed with the Eimco Corp. for one 8-ft 10-in diameter x 5 disc Agidisc filter and auxiliary filtration system equipment for 28x0 fine coal. Filter capacity, 15 tph solids. Completion date, August, 1956.

Lake Superior Coal Co., Cannelton, W. Va.—Contract closed with the Eimco Corp. for one 8-ft 10-in diameter x 10 disc Agidisc filter and auxiliary filtration system equipment for 28x0 fine coal. Filter capacity, 25 tph solids. Completion date, December, 1956.

Barnes & Tucker Coal Co., Barnesboro, Pa.—Contract closed with the Eimco Corp. for one 6-ft diameter x 3 disc Agidisc filter for 28x0 fine coal. Filter capacity, 5 tph solids. Completion date, November, 1956.

Jewell Eagle Coal Co., Melville Mine 9, Stollings, W. Va.—Contract closed with the Deister Concentrator Co. for eight SuperDuty diagonal deck No. 7 coal washing tables for cleaning ¼x0 fraction.

Compass Coal Co., Compass No. 3, Dola, W. Va.—Contract closed with the Deister Concentrator Co. for eight SuperDuty diagonal deck No. 7 coal washing tables and one 108-B Concenco revolving feed distributor for eight-way feed distribution.

Spruce River Coal Co., No. 9, Jeffrey, W. Va.—Contract closed with Daniels Co. for a preparation plant. Facilities include DMS dense media system to wash 5x¼ ROM from the Chilton seam. Completion date, August, 1956.

Miners' Strike Halts W. Virginia Production

While the United Mine Workers leadership had been rubbing friendly shoulders with rail and coal leaders in a plan to capture permanently the overseas coal market (p 122), some UMWA miners were still dealing with management as labor has often dealt with management. Despite the pleas of the highest UMWA brass, a walkout beginning at Consolidation Coal's Williams 98 mine in West Virginia's Harrison County touched-off a sympathy walkout wave that numbed production throughout the northern section of the state for nearly three weeks. It had begun May 25 with the demand that two men should be assigned to a roof-bolting machine. Mine operators had proposed a ratio of three men for two machines. Both sides held fast to their proposals and before the walkout ended on June 12 an estimated 9,500 men from 33 mines in four counties were idle.

As the walkout began the UMWA quickly gathered a crack team of international representatives from Ohio, Pennsylvania and Kansas. But, despite the team, 3,500 men were idle and seven mines had been struck by May 29. Back-to-work meetings failed, one after another, as miners cast overwhelming votes of no confidence. By May 31 an estimated 8,000 were out in 30 mines.

Perhaps hardest hit by the production squeeze was the Christopher Coal Co., which had been assigned by its parent company, Pittsburgh Consolidation Coal Co., to supply 123,000 tons of coal a month to the Kyger Creek power station on the Ohio River. The station supplies power for an atomic energy plant at Portsmouth, Ohio. More than 2,000 of the striking miners were Christopher employees.

By June 3, the work of the UMWA trouble-shooting team was having some effect. Nearly 700 miners from the Barrackville operation of Bethlehem Mines Corp. had returned to work. But still the Williams miners, unofficial pivot of the stoppage, held fast against all arguments and refused to return. Meanwhile, another Bethlehem mine, the Idamay in Marion county went back into the production as the UMWA Journal took "certain local unions" to task because they "saw fit to ignore" a policy that prohibited local strikes without authorization. In Washington, D. C., the International Executive Board of the UMWA took unanimous action against unauthorized strikes and ordered all local unions to utilize provisions of the industry's wage agreement to settle all disputes. Failure to comply with the order, the board warned, would make local unions and officers "subject to discipline and penalties."

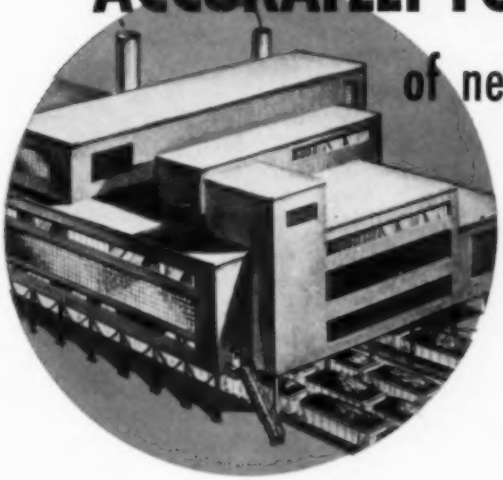
On June 10, Williams miners finally relented without winning more than a promise that they would be able to discuss their grievances with John L. Lewis. Three other major mines followed the movement back to work (Owings No. 32 in Harrison County; Jordan No. 93 in

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of new preparation equipment or plant



Our Pilot Plant Enables You to Solve Feed, Yield and Product Problems in Advance

In the new Wilmot pilot plant, pictured above, you can see commercial size equipment actually cleaning truck or carload samples of your feed. Also located here is a modernly equipped coal laboratory. Both are staffed by technicians with many years experience in coal preparation. We believe you will, like an increasing number of operators and engineers, find these facilities extremely valuable in helping you: (1) solve technical and design problems; (2) predetermine the yield and quality of the products.



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Wilmot Builds Complete Preparation Plants or Single Equipment Units

For nearly 50 years, Wilmot has been designing, building and equipping coal preparation plants exclusively. A wealth of engineering and construction experience is available to you, whether your requirements are a single unit of replacement equipment or a complete plant. Wilmot furnishes the following types of coal cleaning equipment: heavy-media, cone cleaner, classifier, froth flotation. We invite your inquiries.

WILMOT ENGINEERING CO. HAZLETON, PA. *Plant:* WHITE HAVEN, PA.

Marion County; and Jamison Coal & Coke's No. 9 in Marion County). By June 12 the strike was seemingly over.

Gas Pipeline Bill Passed By Canadian Legislature

Canada's government, through four motions of closure and other devices for limiting debate, got its pipeline bill through the House of Commons last month, then through the Senate. Passage meant Canada will loan Trans-Canada Pipelines, Ltd., $80 million to finance construction of the first leg of a line to carry natural gas from Alberta to Quebec. Both Canadian Conservatives and Socialists opposed the bill on the grounds that Canadian taxpayers were subsidizing a foreign corporation, since Trans-Canada is chiefly owned by United States interests.

In the United States, Canadian gas became the subject of a Chicago meeting among coal representatives, railroad and labor groups, who laid plans to attack the export-import plans of Trans-Canada, Tennessee Gas and subsidiary lines, which propose to import Alberta natural gas through the Minnesota border, southeast to Portland, Tenn. In Portland the line would join the main artery of Tennessee Gas Transmission. Meanwhile, increased exports of United States gas via the Niagara line to Toronto and Montreal would build markets that would be ready for unlimited Alberta gas when the cross-continent Canadian line is completed. At the Chicago meeting an opposition "task force" was appointed to prepare a case for presentation to the Federal Power Commission.

The National Coal Association was one of the first to ask the FPC to dismiss applications to import Canadian natural gas and export United States natural gas to Canada. In its request the NCA asked that the FPC dismiss applications of Midwestern Gas Transmission Co., Tennessee Gas Transmission Co., Iron Ranges Natural Gas Co. and Central Wisconsin Gas Co. The NCA also asked the FPC to refuse to reconvene hearings on the applications. Joining the NCA were the United Mine Workers of America, Fuels Research Council, Inc., the Anthracite Institute, Western States Fuel Policy Council, Maher Coal Bureau and The Chesapeake & Ohio Ry.

The NCA argued that neither Tennessee nor Midwestern Gas Transmission had fulfilled the requirements of the Natural Gas Act, and that both companies had failed to show that the project will be required by the present or future necessity of the public. "Tennessee Gas," the NCA said, "is relying on reserves of gas which are not under contract to it and, hence, not legally available to Tennessee to deliver to Trans-Canada." On Midwestern's application the NCA declared, "No showing was made that Trans-Canada has the necessary permits from the Government of Canada authorizing it either to export or import gas."



IMPORTANCE OF ROOF-BOLTING is explained by Lloyd G. Fitzgerald, explosives engineer, U. S. Bureau of Mines, to employees of the New River Co., Summerlee Mine, Summerlee, W. Va., in the USBM's accident prevention course. Main topic was "How Roof-Bolting Can Reduce Roof-Fall Hazards." More than 400 employees heard how the roof bolt will increase safety in the mines. Listening are Russel Young, machine operation (seated at left); Erskine McGhee, boom operator; Eugene Allen, shaft repairman; and Floyd Brooks, motorman. Standing are Melvine Akiers, conveyor worker (left); Frank Wilson, machine worker; and N. A. Roles, machine man.

News Briefs

President Eisenhower has nominated Marling J. Ankeny, safety director of the Bituminous Coal Operators Association, to be chief of the U. S. Bureau of Mines. The nomination, subject to Senate confirmation, was the result of a recommendation by Fred A. Seaton, new Secretary of Interior. Mr. Ankeny has served as chief of the coal mine inspection branch of the USBM (1947 to 1952) and as the USBM's senior mining engineer (1942 to 1947). He has been safety director of the operator association since 1952.

Day shift miners at U. S. Steel's Robena Mine in Waynesburg, Pa., returned to work June 13 after a 3-day walk-out protesting a safety issue. The miners had balked when one of them was injured by a mine car drag. The drag is a required blocking device.

Pennsylvania State University's Dean of the College of Mineral Industries, Dr. E. F. Osborn, has announced that six scholarships in fuel technology have been established at the University. The scholarships pay a student $500 a year and are available to high school students who can meet entrance requirements. The grants were made by Bituminous Coal Research, Inc., Eastern Gas & Fuel Associates, Koppers Co., National Coal Association, Pittsburgh Consolidation Coal Co. and an anonymous coal executive.

A reported 93.5% of the anthracite industry has agreed to a new production control plan devised by the Anthracite Committee of 12, based on percentages apportioned to cooperating producers. Under the plan, which the Committee was ready in June to present to Governor George M. Leader of Pennsylvania, each producer will accept a "percentage position" to supply market demand. The percentages proposed have not been announced. Anthracite production is under state direction with companies participating voluntarily. Gov. Leader was to be asked to put the schedule into effect after producers approve it.

Bituminous Output

YEAR TO DATE	PRODUCTION
June 16, 1956	238,715,000
June 18, 1955	207,103,000

1956 output 15.3% ahead of 1955.
A month earlier output was 17.4% above 1955.

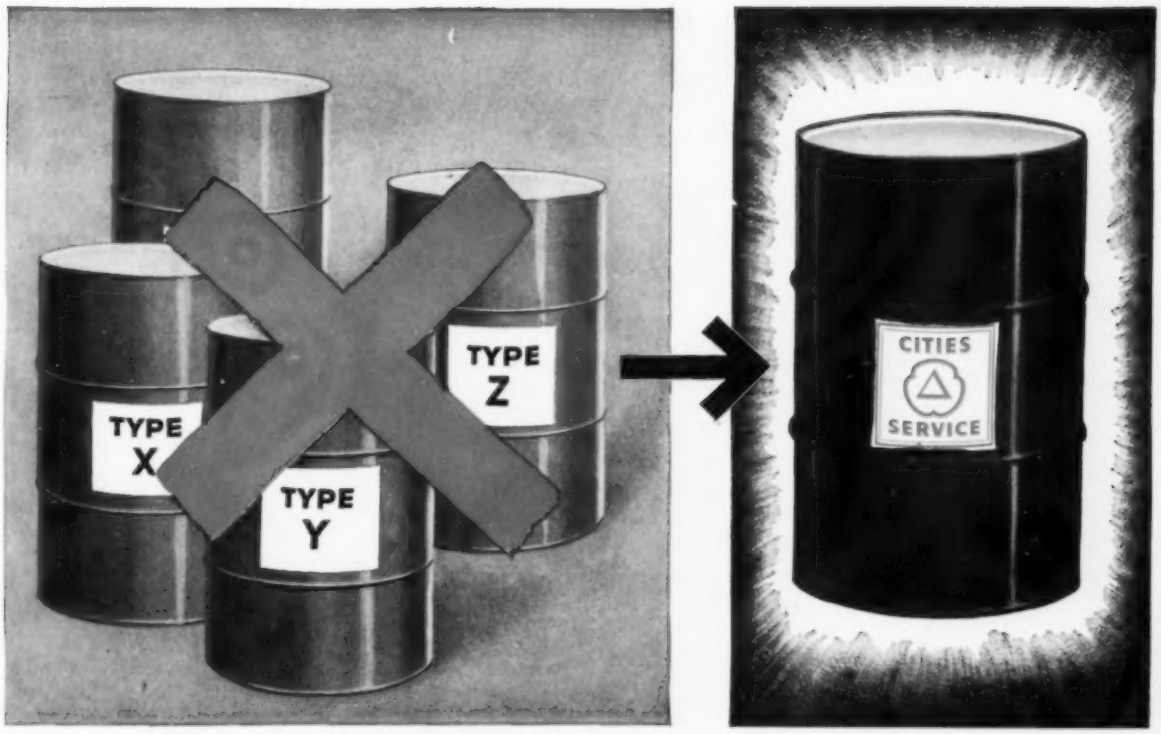
WEEK ENDING	PRODUCTION
June 16, 1956	10,280,000
June 18, 1955	9,481,000

Anthracite Output

YEAR TO DATE	PRODUCTION
June 16, 1956	12,408,000
June 18, 1955	12,237,000

1956 output 1.4% ahead of 1955.
A month earlier 1956 output was 4.9% ahead of 1955.

WEEK ENDING	PRODUCTION
June 16, 1956	538,000
June 18, 1955	569,000



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Used for all types of bearings, chassis lubrication, water pumps and conveyor systems, this one unmistakable "red" grease is ideal for everything from the smallest service truck to the largest shovel.

New Multi-Purpose Trojan H not only has greater stability than previous greases, it also pumps easier at low temperatures, flows easier, and has exceptional resistance to water, oxidation, and rust. Best of all, it lasts longer and tests show it takes *less* to do this superior job of lubrication. Result: You save time, confusion, and money!

For more information about this unusual multi-purpose grease, talk with your Cities Service representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

USE JUST ONE GREASE
and get all these benefits

- Simplified inventory
- No possibility of error in application
- Less grease consumption
- Easier dispensing
- Less lubrication time
- Better grease stability

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



Princess Elkhorn Coal Co., David, Ky., has announced the winners of its twelfth annual scholarship program. This year's four awards brings to 50 the number of scholarships presented to outstanding seniors in Kentucky's Floyd and Johnson Counties. The winners: Randal Honeycutt of Cliff; Phyllis J. Hammond of David; Toby A. Bussey of David; and Robert E. Bowling of Garrett.

Hanna Coal Co. has purchased 15,700 acres of coal lands in West Virginia's Ohio and Marshall counties. The acreage was bought for an undisclosed price from the Lorain Coal and Dock Co. Hanna's president, James Hyslop, says the company does not plan any immediate mine openings on the property.

Ground has been broken at the University of Louisville, Louisville, Ky., for a new $500,000 addition to the Speed Scientific and Engineering School. The addition is the result of a bequest by the late William S. Speed before his death Dec. 1, 1955. Mr. Speed was head of the Speed-controlled eastern and western Kentucky coal mines and the Louisville Cement Co.

Glen Alden Corp. reopened its Avondale Colliery in Pennsylvania's Plymouth township. The colliery was closed early in May after Glen Alden had announced that operating costs were too high. The resumption of work will mean re-employment for 200 miners.

The Moffat Coal Co. has sold the Diamond Colliery, Scranton, Pa., for $700,000 to the Diamond Colliery Co., Wilkes-Barre.

Between 3 and 4 million tons of U. S. coal was purchased for the Association



UMWA HOSPITALS DEDICATED— John L. Lewis speaks at the June 2 dedication in Beckley, W. Va., of 10 hospitals built by the UMWA. Six hospitals are located in Kentucky (Harland, Whitesburg, McDowell, Pikeville, Hazard and Middlesboro), three are in West Virginia (Williamson, Man and Beckley), one is in Wise, Va.

of West Germany's Steel and Iron Manufacturers in New York last month by Dr. F. W. Siebert, director of Phoenix-Rheinrohr AG., Dusseldorf, Germany. During the purchase Dr. Siebert said "we have become a permanent customer of United States coal exporters, although, because of high ocean freight rates, American coal is about $10 per ton higher than our own.

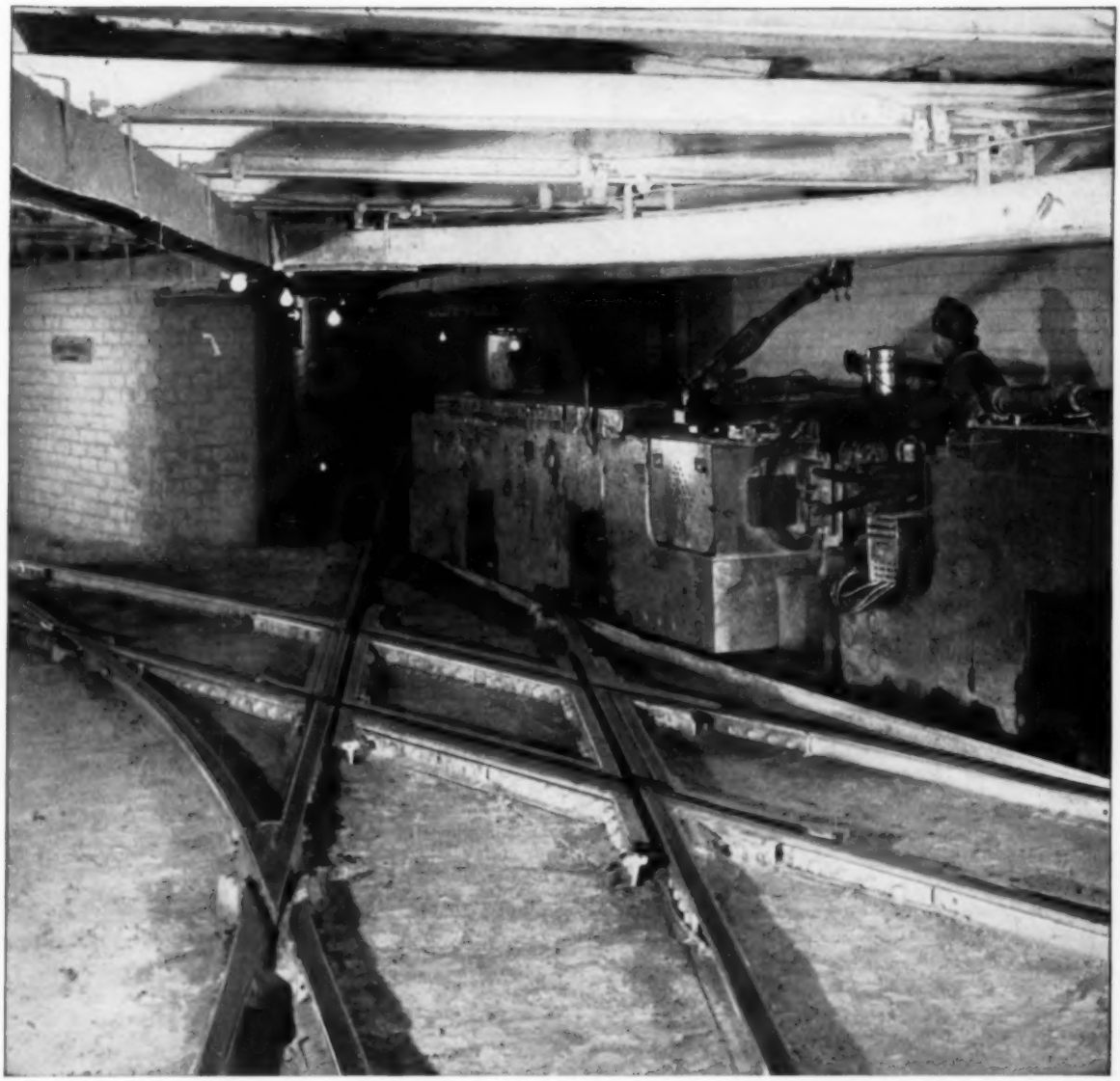
Eastern Gas & Fuel Associates reports it is buying the Colver, Pa., mine owned by the Ebensburg Coal Co. A 5,000-tpd producer, the mine is completely mechanized and will be the third owned by Eastern Gas & Fuel in Pennsylvania. The company operates 13 mines in West Virginia. The Ebensburg Co. is expected to be dissolved.

A New York company, Simpson Coal & Chemical Corp., has purchased the Seanor Mining Co., Westmoreland County, Pa. Purchase price was $1,000,000. The mine is one of the largest operations in the county, producing 2,100 tpd. It was opened in 1947. Simpson Coal & Chemical also purchased the Wyatt Coal Co., Charleston, W. Va., several months ago. Seanor's new officers are Paul Bock, president; Carl Schumer, secretary; and Alfred Adrian, treasurer. Seanor's name will become the Seanor Coal Corp.

Washington's Bonneville Power Administration has proposed furnishing dump power to the Washington State Power Commission to permit construction of a coal-fired steam electric plant in the Roslyn-Cle Elum coal field. If the proposal is realized, a steam plant of 300,000-kw capacity would be operated 6 mo a year, making it possible to offer firm power throughout the year. An estimated $4,000,000 worth of coal will be used annually. This is expected to assure full operation of the now curtailed coal mines. The Washington Power Commission has confirmed that the proposal is being studied and has said that if dump power could be obtained cheaply enough, a blended hydro-steam rate attractive to industry would result.

Northwestern University, Evanston, Ill., which was once heated with pot-bellied coal stoves (1851) and has been a customer of coal for 105 yr is planning a $2-million investment in a modern, coal-heating plant. The existing plant consists of three Stirling four-drum 25,-

(News Briefs Continued p 132)



How to be sure you're on the right track

One of the surest ways to cut into the cost of mining coal is to improve and speed up the method of bringing it out. And in most mines you can't talk about haulage without including a discussion about track.

If your mine is one of those with a haulage problem, a good way to get on the right track is to talk with Bethlehem. Have one of our engineers visit your workings.

There he will absorb all you tell him about your operations, both present and proposed. Then he'll return to Bethlehem to go into a huddle with mine-track specialists here. Plans will be drawn up for your approval. Next, all rail material will be prepared according to plan, even including pre-cutting to length and curving to radius.

All components will be completely assembled on our layout floors before a single piece is shipped to you. When your order arrives at the jobsite, everything will fit smoothly into place, without waste or worry.

This kind of trackwork is an economy step that is being taken by more and more mines. Yes, we said "economy"—for trackwork scientifically planned this way lowers maintenance costs, soon pays for itself. A Bethlehem engineer is available right now to start working with you. A call or note to our nearest office will start him on his way.

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Foreign News

WESTERN EUROPE

Western European consumption of all forms of energy is rising so rapidly that it is likely to reach the equivalent of 1 billion, 200 million tons of coal equivalent in 1975 against 730 million tons in 1955. This prospect was reported last month by the Organization for European Economic Cooperation (OEEC). (In Washington, D. C., Walter J. Tuohy, president of the Chesapeake & Ohio Ry., forecast similar needs for Western Europe: his estimate—1 billion, 323 million tons of coal by 1975.) At the same time the OEEC declared that the gap between demand and supply will continue to grow. By 1975 Europe will have to spend $5 billion on imports of coal and oil. The OEEC emphasized that it would be an error to believe that nuclear energy will make large contributions to the supply of energy in Western Europe in the next 20 yr. The committee estimated that nuclear energy would not exceed 80 million tons of coal equivalent by 1975, less than 8% of the total requirements. It warned the Western European nations that unless a special effort was made to promote their own productions of primary energy the gap would have to be bridged with imports soaring to the $5 billion mark. (Last year the western nations of Europe spent $1.9 billion abroad to meet their energy demands.) As a result, the committee warned, unless Europeans develop their coal reserves the "cost of these large additional imports of energy may present some countries with a serious problem regarding their balance of payments."

In the United States the coming energy plight of Western Europe has been greeted by coal men with hard work and eager planning. In Washington, during the National Coal Association convention, the United Mine Workers, rails and several coal companies announced an unprecedented financial pact and prepared to issue $50 million worth of stock to buy ships to send to Europe with coal (p. 122).



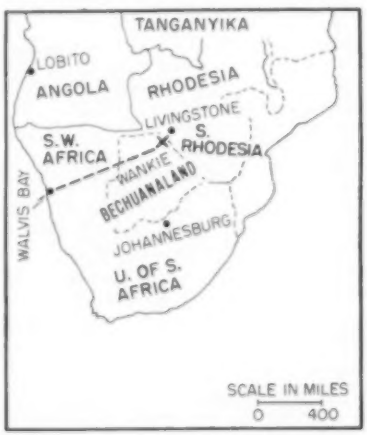
DUST FREE PNEUMATIC DRILL from Czechoslovakia has a hollow tool and bit. Operating without any wetting agent the drill sucks up powder and chips as soon as they are cut, then propels them through a flexible pipe to a separate container. The drill is designed for work on both coal and stone, and was developed by the Scientific Research Institute in Ostrava.

AFRICA

Ever since Great Britain's stream of empire builders (e.g. Cecil Rhodes) hacked out a pattern of English trails through Central Africa one of the earliest dreams of the British African empire builders has been to build a railway line from Wankie (map) in Southern Rhodesia westward across Bechuanaland to the port of Walvis Bay in southwest Africa. But the dream stayed a dream because of prohibitive costs and it received little attention. Now a British Conservative MP named Graham Page has revived the railway idea, tying it to hard, economic facts. Campaigning for the railway in Africa and in England, Mr. Page has made it a live issue because Central Africa's rapid economic development has run ahead of the carrying capacity of the existing Rhodesian railways. As a result, the Northern Rhodesian copper-mining companies have been forced to import coal from Virginia through the Portuguese West African port of Lobito Bay because local railways cannot transport enough coal northwards from the vast Rhodesian coal fields at Wankie. United States coal costs the companies a delivered price of $39 a ton. As a result MP Page tours England and Africa with the slogan "We want Wankie coal to take the place of Yankee coal."

The Wankie field is said to be one of the largest in the world. Its full extent has never been calculated with accuracy, but the seam which comes to the surface at Wankie itself is known to stretch north at moderate depths for at least 80 mi. Mr. Page and a group of British Conservative MP's say that the Wankie Colliery could satisfy all Rhodesia's coal demands and provide at least 10 million tons a year for the United Kingdom. Critics say the cost ($280 million) of building the railway and extending the colliery's output are still too high. To this Page answers: "Britain has invested $980 million in coal mines in the last 5 yr and has been able only to maintain present production.

"Britain now proposes to invest $2 billion, 800 million in her existing mines in the next 10 yr to put up production by 19 million tons a year. Of this $1 billion, 960 million will go toward keeping production at its present level. The remaining $840 million is the cost of increasing the rate by 19 million tons in 10 yr. Therefore, an estimate of $280 million for bringing Wankie coal to Britain should not frighten us."



WALES

Two hundred seventy-nine tired miners were digging deep for coal last month in their fight for a reprieve. In the town of Gwaun-Cae-Curwen the men were being watched in a two-week test for survival ordered by Britain's National Coal Board. Annoyed by low production figures and a total of 249 strikes in the mine since 1947, the Coal Board ordered the mine shut down. The miners appealed for another chance. The Coal Board, which had fired all 1,065 men working the mine, agreed to a two-week test. The Board said the miners had been producing only 7.4 hundredweight of coal per man per day before the shutdown. This compared to an average of 19 hundredweight elsewhere. Thus far, the Coal Board is pleased with the test results.



NEOPRENE belt carries 500 tons of coal a day for 3 years ... no maintenance, no downtime, good as new!

Three years ago, officials of the Electro Metallurgical Company's Hernshaw Mine at Alloy, W.Va., read about neoprene conveyor belting and decided to try it.

900 feet of neoprene belting were installed in the mine's main conveyor system, which consists of two 1,500-foot sections (6,000 feet of belting). The conveyor travels at 320 fpm and operates around the clock five days a week, moving about 500 tons of coal per day.

Three years of service is a short period in the life of a good belt, but the neoprene sections show no signs of wear at all. "If you brush the dust off the neoprene," says Mine Superintendent F. E. Burger, "you won't be able to tell it from new belting." It has required no maintenance and has caused no downtime. Operating characteristics are no different from conventional belting, both underground and at the mine head where the belt is exposed to sunlight and weathering.

Neoprene belting offers you **OUTSTANDING RESISTANCE TO ABRASION, AGING, OIL AND GREASE.** In addition to these properties of neoprene, which hold replacement and maintenance costs to a minimum, it has the added advantage of being flame retarding and its fire resistance adds greater safety to mine operation. Be sure the next belt you buy will give you long, safe, dependable service ... be sure it's neoprene.

FREE! THE NEOPRENE NOTEBOOK. Every issue contains new illustrated case histories, interesting articles, new applications of neoprene. Clip and mail this coupon to E. I. du Pont de Nemours & Co. (Inc.), Elastomers Division CO-7, Wilmington 98, Delaware.



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GREAT BRITAIN

More than a year ago (May 22, 1955) Britain's National Coal Board launched a sea-boring tower from St. David's harbor, Inverkeithing, Scotland (map), that was towed down the Firth of Forth by tugs and grounded at a point about 1¼ mi off-shore. Last month the Board disclosed that the first off-shore borehole for proving undersea reserves of coal was nearly complete and that a limestone group of coals it had sought had been proved. The Board also said that it was satisfied with the tower designed for the purpose. In their experiment the British were seeking a method of drilling for coal at sea in much the same way as drilling is performed on land. Drilling rods were enclosed in a guide tube. After the first part of the borehole was prepared by chisel and rotary roller-bit drilling, a diamond crown was fitted and coring began. The borehole sank at a rate of 130 ft a week.





BORING TOWER for proving reserves of undersea coal being towed down the Firth of Forth near Inverkeithing, Scotland (see map) to a drilling position about 1¼ mi off the Fife coast in the Firth of Forth. Britain's National Coal Board, the sponsor of the undersea probe, reports the first borehole is nearly complete. Tower weight 500 tons.

In London, provisional figures released by the British Ministry of Fuel and Power show that coal output in Britain so far this year amounts to 96,690,000 tons, an increase of 995,100 tons for the same period in 1955. Total output in the last week of May was 4,659,800 tons, an increase of 1,277,800 tons on the previous week and 1,348,300 tons more than the corresponding week in 1955.

POLAND

The use of explosives has all but disappeared at a number of Polish mines since the introduction of the "Kardocks" (sic) coal extracting method. (The method is the Cardox technique which was introduced here by the Cardox Corp. many years ago in which liquid carbon dioxide is used in place of explosives. The carbon dioxide expands rapidly when warmed suddenly).

The use of the liquid detonator is to be extended into gassy mines, also, according to reports.

CHINA

Deposits estimated at 200 million tons of coal and oil shale have been discovered in northwest China (Kansu Province), according to reports from the New China News Agency. The average thickness of the seams in the coal field is said to be 20 meters (65 ft). Two seams of oil shale are reportedly 10 meters (32 ft) thick.

A British representative to the World Power Conference in Vienna said last month that a British atomic reactor design permits the production of twice as much power as previous designs for the same costs. As a result, John V. Dunworth said, atomic power is competitive with coal. Mr. Dunworth, head of the Reactor Physics division of the British Atomic Energy Authority, disclosed that improvements in plants of the Calder Hall design have resulted in a new reactor that produces as economically as coal.

News Briefs *(from p 128)*

000-lb an hour Babcock & Wilcox boilers and one 50,000-lb an hour four-drum Stirling B&W boiler with combustion chain grate. The 50,000-lb B&W boiler will be re-situated in the new plant and two new 90,000-lb two-drum Erie City boilers with Combustion Engineering's traveling grate stokers will be installed. The plant is scheduled for completion in in the fall of 1957.

A contract for shipment by boat of 300,000 tons of coal during the 1956 Great Lakes shipping season has been signed by officials of Toledo Edison and the Republic Coal & Coke Co., Cleveland. The tonnage will be in addition to 270,000 tons contracted for last year. Nearly all the tonnage comes from western Pennsylvania and northern West Virginia. And, although lake coal travels a greater distance to Toledo, lake shipping makes possible a saving of nearly 7% for Toledo Edison.

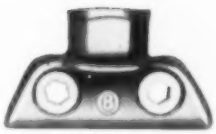


OLD TIMERS AWARD WINNER Robert W. Helfer, June graduate of Penn State, is presented with inscribed timepiece by S. M. Cassidy, vice president of Pittsburg Consolidation Coal Co. Mr. Helfer received the watch at a dinner in Penn State's Hetzel Hall before graduation last month. After receiving his BS in Mining Engineering he began working for the Seanor Coal Co.



Insulated Hangers

1



Trolley Wire Clamps

2



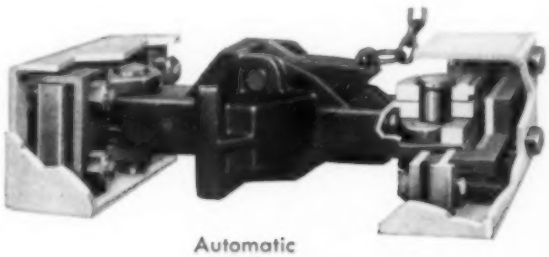
Feeder and Trolley Splicers

3



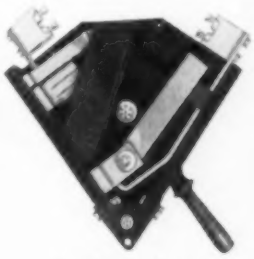
Combination Feeder-Trolley Clamps

4



Automatic Couplers

5



Feeder Safety Switches
(cover removed)

6



Branch Connectors

7

Ohio Brass

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Ohio Brass is one of the world's largest suppliers of electrified mine haulage equipment—has been since before the turn of the century. That's why so many operators look **first** to O-B for the answers to their mine haulage problems.

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Rail Clamps

8



Expansion Bolts

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Current Collectors

10



Fused Taps

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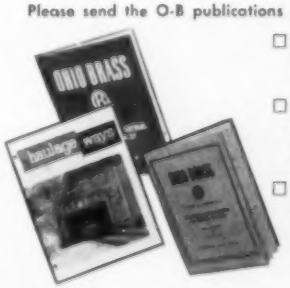
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Personal Notes

Michigan College of Mining & Technology, Houghton, Mich., awarded **William J. Skewes,** chief engineer of the Pocahontas Fuel Co., Pocahontas, Va., an honorary degree of master of engineering at the college's honors convocation June 1. Mr. Skewes has been associated with mining for 33 yr. He joined Pocahontas in 1930, beginning as a mechanical engineer, became its chief engineer in 1949. He achieved a degree of fame when Pocahontas constructed a 13.6-mi drainage tunnel to serve five of its mines. He also helped reopen the Itmann mine and supervised much of the construction of the redesigned tipple and cleaning plant. During the presentation **Professor Welfrid Been,** head of the mining engineering department at Michigan Tech, said: "He has brought to the American coal industry a rare engineering ability. He typifies the American genius for doing the 'impossible.' He typifies as well the American system whereby we combine knowledge, work and resources to achieve a standard of living and security."



William J. Skewes

Stanley B. Johnson, Jr., president of the Lorado Coal Mining Co., was elected executive vice president of the Lorain Coal & Dock Co. at the company's annual meeting June 11, in Columbus, Ohio. At the same time **Stanel B. Johnson, Sr.,** was returned to the posts of president of the Lorain Coal & Dock Co. and chairman of the Lorado Mining Co. The company's directors disclosed that **James R. Johnson** had announced his retirement as vice president of both companies and that **Frank A. Burke** had been elected to vice president in charge of sales, Lorain Coal & Dock Co. In other action the board appointed **Robert L. Seith** vice president of The Lorado Coal Mining Co. and renamed **A. C. Saunders, Jr.,** vice president of Lorain Coal & Dock Co.

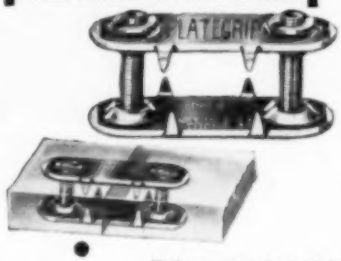
James L. Hamilton, a director of Island Creek Coal Co. since June, 1955, was elected executive vice president of the company at a board meeting in Boston, Mass., June 12. Mr. Hamilton was also elected executive vice president of Island Creek Fuel & Transportation Co., a vice president of Island Creek Coal Sales Co., the United Thacker Coal Co., and the Queen City Coal Co., subsidiaries of Island Creek Coal Co. At the same time **C. R. Mabley, Jr.,** vice president of sales, was elected president of Island Creek Coal Sales Co. and vice president of Island Creek Coal Co., in charge of sales. **Raymond E. Salvati,** president of Island Creek Coal Co., was elected vice chairman of the sales company.

A. V. Sproles, Jr., has been appointed director of labor and personnel relations, Pocahontas Fuel Co., effective June 1. The promotion was the second in two months for Mr. Sproles. In April he was appointed superintendent of the Angle Colliery. In his new job, Mr. Sproles succeeds **Joseph C. Turley, Jr.,** who has been kept on as advisor and consultant.

The Dawson-Daylight-Collieries Cos., Dawson Springs, Ky., have announced eight top-level promotions among its five incorporated member companies. (Dawson Coal Co., Dawson Daylight Coal Co., Dawson Collieries, Dawson Coal Sales Co., Day-light Collieries Stores). Heading the list of promotions is **Joseph H. Schneider,**

PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS

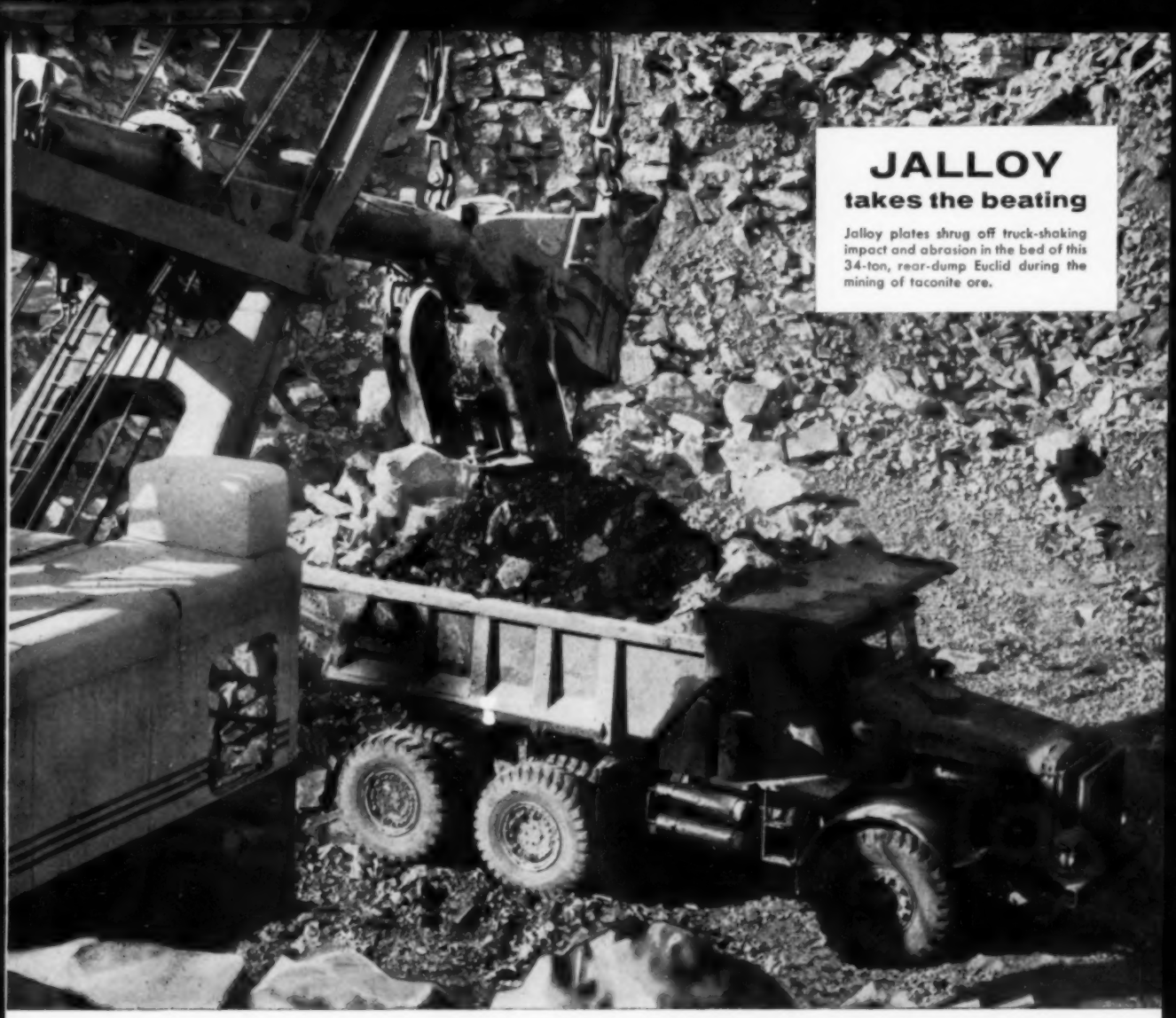


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Jalloy is available in three grades:

No. 1—for applications requiring excellent formability or where a low carbon alloy steel possessing good physical properties before or after heat treatment is specified. This is an ideal carbonizing grade.

No. 3—a general purpose steel capable of being heat-treated to excellent physical properties. Compared to ordinary mild steels it offers good resistance to abrasion or wear in the as-rolled state; but when heat treated to Brinell 340 and above, optimum abrasion and impact resistance is secured.

No. 7—possesses high hardness together with good ductility or wear resistance. Excellent for spring applications as well as flat work.

Jalloy high strength steels are available as plates, structurals, bar and small shape sections, hot rolled sheets, as well as strip and wire products.

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Complete data concerning *Chemical Composition . . . Heat Treatment . . . Weldability . . . Physical Properties . . .* will be mailed to you promptly. Write today for your copy.

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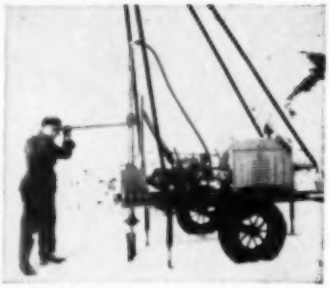
Why guess when these low-cost, easy to operate Acker LD Core Drills tell you

Quickly!

Easily!

Inexpensively!

1. Quality of Coal
2. Thickness of Seam
3. Depth of Overburden



Model LD powered with a 12HP motor for depths to 300'.



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For simplicity of design and operation you just can't beat the Acker LD. We've kept moving parts to a minimum and eliminated all feed gears or screws. (Elimination of unnecessary parts cuts down weight, too—an advantage when operating in isolated locations.)

Our newly designed double tube core barrel retrieves samples even where others fail!

Your choice of power and mounting.

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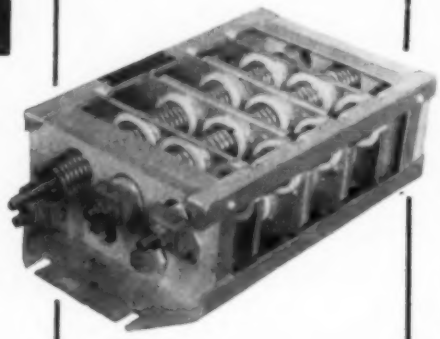
ACKER DRILL CO., INC.
SCRANTON 3, PA.

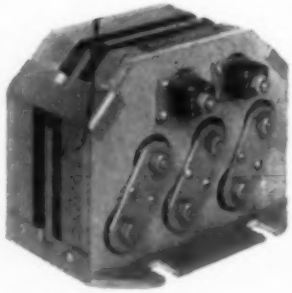
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Guyan Resistors are available for all types of mining machines and loaders. No alterations are necessary. The resistors are designed to fit the original pockets of the machines.

Note the lightweight sturdy framework of angle steel fabrication. The helical coil resistance element can be removed quickly and easily should repair be necessary. Guyan Resistors are available from stock for all common types of mining machines. Resistors can be furnished for any type machine when correct information is made available.





GUYAN MACHINERY CO., *Logan, W. Va.*

Personal Notes *(Continued)*

former president of the Dawson Daylight Coal Co., who moves to chairman of all five companies. As chairman Mr. Schneider announced these promotions: **William A. Von Borries,** president of mining companies; **Victor C. Roerk,** president of the store company and vice president of accounting, all companies; **Walter A. Morris,** vice president of sales, all companies; **Paul W. Lynch,** secretary, all companies; **Bayne Keller,** treasurer, all companies; **Joy Cunningham,** sales manager, all companies; and **Earl Fork,** cashier, all companies.

North American Coal Corp., Cleveland, Ohio, has announced the election of **Dr. Robert L. Savage** as vice president in charge of research. The position was established to provide supervision of the company's activities in processing and utilizing coal and coal products.

Obituaries

Clarence Maurice Schwerin, Jr., president of the Vinton Coal & Coke Co., Vintondale, Pa., died in Old Westbury, Long Island, N. Y., after a long illness. He was 48. Mr. Schwerin was also president of the Delano Coal Co., New York, N. Y., and a partner in the New York Stock Exchange firm of Schwerin, Stone & Co.

Joseph C. Prather, 56, chief inspector of mines in the Lynch (Ky.) group owned by United States Steel Corp., died in Pittsburgh, Pa., of a heart attack June 20.

Association Activities

A. E. Oakley, Montcoal, W. Va., mine superintendent for Armco Steel Corp., was elected president of the Coal River Mining Institute at its annual meeting.

W. W. Goldsmith, president of Floyd County Coal Co., Charleston, W. Va., has been reelected president of the Big Sandy-Elkhorn Coal Operators Association; **G. O. Tarleton,** president of Consoldation Coal Co., Jenkins, Ky., has been elected vice president; and **L. B. Brasher,** president of Stephens Elkhorn Fuel Corp., Manton, Ky., has been reelected treasurer. The association members also reelected **C. W. Davis** executive secretary.

Marlin J. Weber, vice president, Bird Coal Co., Johnstown, Pa., has been reelected president of the Somerset County Coal Operators Association; **John M. Dovey,** president of Cambria Fuel Co., has been elected vice president; and **C. B. Berkey, Jr.,** president of the Wilbur Coal Mining Co., has been elected treasurer. The association's members also chose **Martin L. Market, Sr.,** to return as secretary for his 24th consecutive term.

MEETINGS

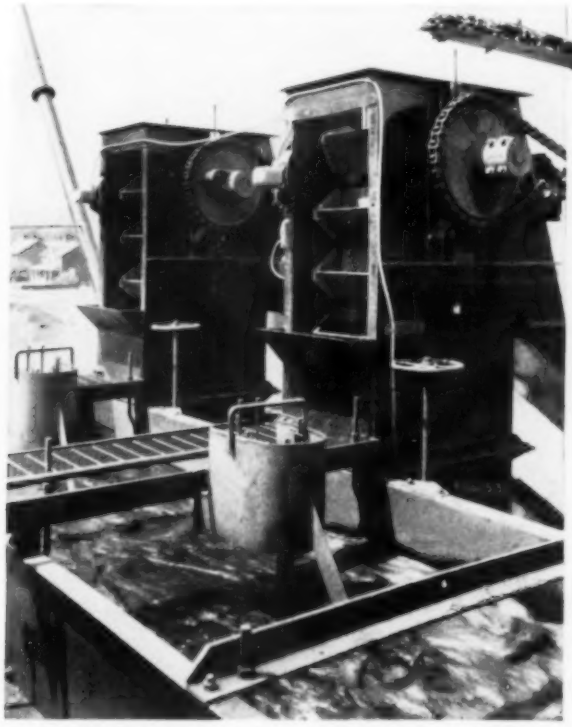
ASME-ASLE Lubrication Conference; Oct. 8-10, Chalfonte-Haddon Hall, Atlantic City, N. J.

JEFFREY STR* CHAIN

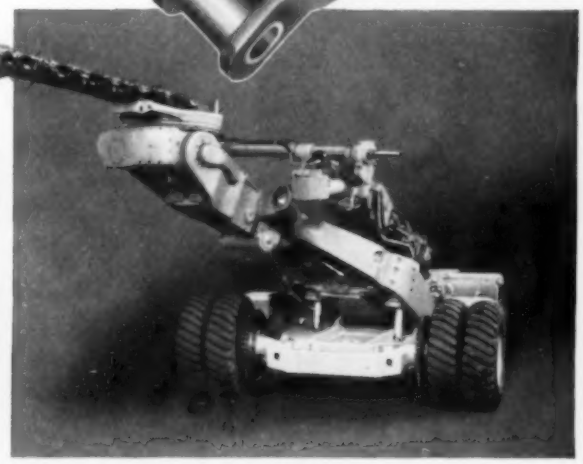
has the reserve strength necessary for hard work and sudden overloads



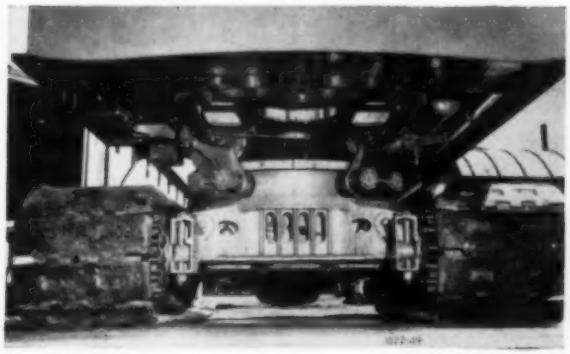
*Steel Thimble Roller Chain



Jeffrey STR Chain on bucket elevator drive of coal cleaning jig.



Jeffrey STR Chain on traction wheels of large universal coal cutter.



Jeffrey STR Chain on crawler drive of power shovel.

YOU SEE MORE and more Jeffrey STR Chain every day. Jeffrey's own high-quality mining equipment uses Jeffrey STR for dozens of power transmission and conveying applications. Other manufacturers incorporate Jeffrey STR as original equipment on machines they make. And mine operators everywhere replace chain drives of whatever make with Jeffrey STR.

With Jeffrey STR you get a balanced chain design with maximum strength and minimum weight. Moreover you get the reserve strength so necessary for the hard work and sudden overloads common under the full-scale operations in the resurgent coal industry.

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Among the Manufacturers

In St. Louis, Mo., the Lincoln Engineering Co., lubricating equipment manufacturer, announced it had been merged with The McNeil Machine & Engineering Co., Akron, Ohio. McNeil is the surviving corporation. Lincoln's full name now is Lincoln Engineering Co., Div. of The McNeil Machine & Engineering Co. Lincoln is the third company picked up by the McNeil Corp., which recently acquired the Cleveland Crane & Engineering Co., Wickliffe, Ohio (overhead material handling equipment), and the Hamlin Metals Products Corp., Akron. McNeil, itself, manufactures presses for molding and curing rubber tires, which it supplies to rubber companies.

A $5.5 million engineering and research expansion program has begun at the Milwaukee plant of the Le Roi Div., Westinghouse Air Brake Co. Le Roi plans to spend the money over a 5-yr period and has already contracted for laboratory facilities worth $500,000. As part of the expansion the company has established a metallurgical section and is reorganizing its quality control department. The Milwaukee plant produces portable and stationary air compressors and internal combustion engines.

From Gainesville, Fla., the General Electric Co. says it will transfer its Communication Equipment Section, which does a multi-million dollar a year business in its Syracuse and Utica, N. Y., bases to a 300,000 sq ft plant ten miles northwest of Gainesville. The new plant, which will be built in three sections (headquarters and laboratories, manufacturing operations and a cafeteria), is expected to cost General Electric $4 million. The plant will take two yr to construct and will employ some 1,700 persons. The Communication Equipment Section produces two-way mobile radio communication products, microwave products, power line carriers and terminal equipment.

Freeman Stoker Div., Illinois Iron & Bolt Co., Carpentersville, Ill., has bought the stoker business of the Combustioneer Div., Steel Products Engineering Co., Springfield, Ohio. The amount of the transaction is undisclosed, but Freeman says the acquisition became effective June 1. Combustioneer's equipment, parts, tools, dyes, patterns and jigs are being transferred to Freeman's Carpentersville facilities where arrangements have been completed for Automatic Solid Fuels Equipment, Inc., to distribute Combustioneer stokers and parts.

Koppers Co., Inc., Pittsburgh, Pa., is buying two tracts of land in two states for erection of manufacturing, development and research facilities. A 285-acre tract near Arroyo, W. Va., on the Ohio River has been purchased as the site of a processing plant for the manufacture of nicotinic acid (niacin) and for a development plant in which Koppers technicians will seek to upgrade coal tar chemicals. The company says it plans ultimately to spend several million dollars in plant construction at the site, but meanwhile is holding down construction to a small part of the 285 acres. Koppers other land purchase consists of a 176-acre tract near Monroeville, Pa., where a multi-million dollar research center will be built. The center will eventually house employees and research facilities now at Koppers' Verona, Pa., research center.

A new district office and warehouse to house its mining division is being opened by the Jeffrey Mfg. Co. in Evansville, Ind. Thomas E. Davis has been appointed district manager and Owen Donham warehouse manager. Mr. Davis, a Jeffrey sales employee for 22 yr, was with the company's Chicago office. Mr. Donham, a Jeffrey man for 20 yr, accumulated his warehousing experience with the company in three states.

Koehring Co., Milwaukee, Wis. (power shovels, cranes, trenchers, pavers), has disclosed plans to acquire through merger the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio (plastic injection molding, die casting machines), for more than $5 million. Koehring, which has acquired three plants in the last 5 yr, wrote sales orders last year totaling $30 million. Hydraulic Press reportedly controls a sizable portion of the plastic injection molding and die casting machine field.

Jack R. DeBacher has been elected a full vice-president of the Thor Power Tool Co., Aurora, Ill. Mr. DeBacher's activities will include all phases of the company's centralization of Thor manufacturing, sales and engineering divisions.

Kennametal Inc., Bedford, Pa., has appointed Edward J. Carroll an assistant sales manager of its Mining Tool Div. He was formerly assistant superintendent of U. S. Steel's Robena mine. His headquarters will be at Kennametal's offices in Bedford, Pa.

Crane Co., Chicago, Ill., has announced two executive appointments in two of its major sales divisions. The appointsments went to J. W. Greene, who was named director of industrial sales, and W. A. Burbine, who was named director of heating sales. Both men were district managers before the appointments, Mr. Greene in the east, Mr. Burbine in the mid-west.

Since June 1, the sales and service operations of Byron Jackson pump products has been handled under the name Byron Jackson Pumps, Inc., a new addition to the Byron Jackson group of Borg-Warner. New officers: E. S. Dulin, president; Robert Harcus, executive vice president; N. D. Jesse, vice president and manager of sales; and W. S. Thomas, vice president, secretary and treasurer.

The Salem Tool Co., Salem, Ohio (McCarthy earth and rock boring auger drills, coal recovery drills), has reorganized its management to supervise expanding operations. James H. Wilson, president, announced these appointments: J. H. Wilson, Jr., works manager; George Adams, chief engineer; Vincent J. McCarthy, sales manager; Kenneth Rogers, office manager; Raymond Lowry, plant superintendent; Donald Thomas, parts manager; and Frank S. Painter, purchasing agent.

Goodman Mfg. Co., Chicago, Ill., has appointed three new assistant district sales managers: John Bragdon, Terre Haute, Ind.; John Cosgrove, Huntington, W. Va.; and Charles Reese, Pittsburgh, Pa. Mr. Bragdon and Mr. Cosgrove have served the Indiana and West Virginia territories for a number of years and will continue at their residences. Mr. Reese comes to Pittsburgh from Chisholm, Minnesota.

Howe Scale Co., Rutland, Vt., has appointed A. R. Haskins its Chicago branch office manager and Robert N. Elliott its Cleveland branch manager. The company also announced that W. J. Jensen, Howe's man from Rutland, Vt., will work with Mr. Haskins in Chicago as service manager.

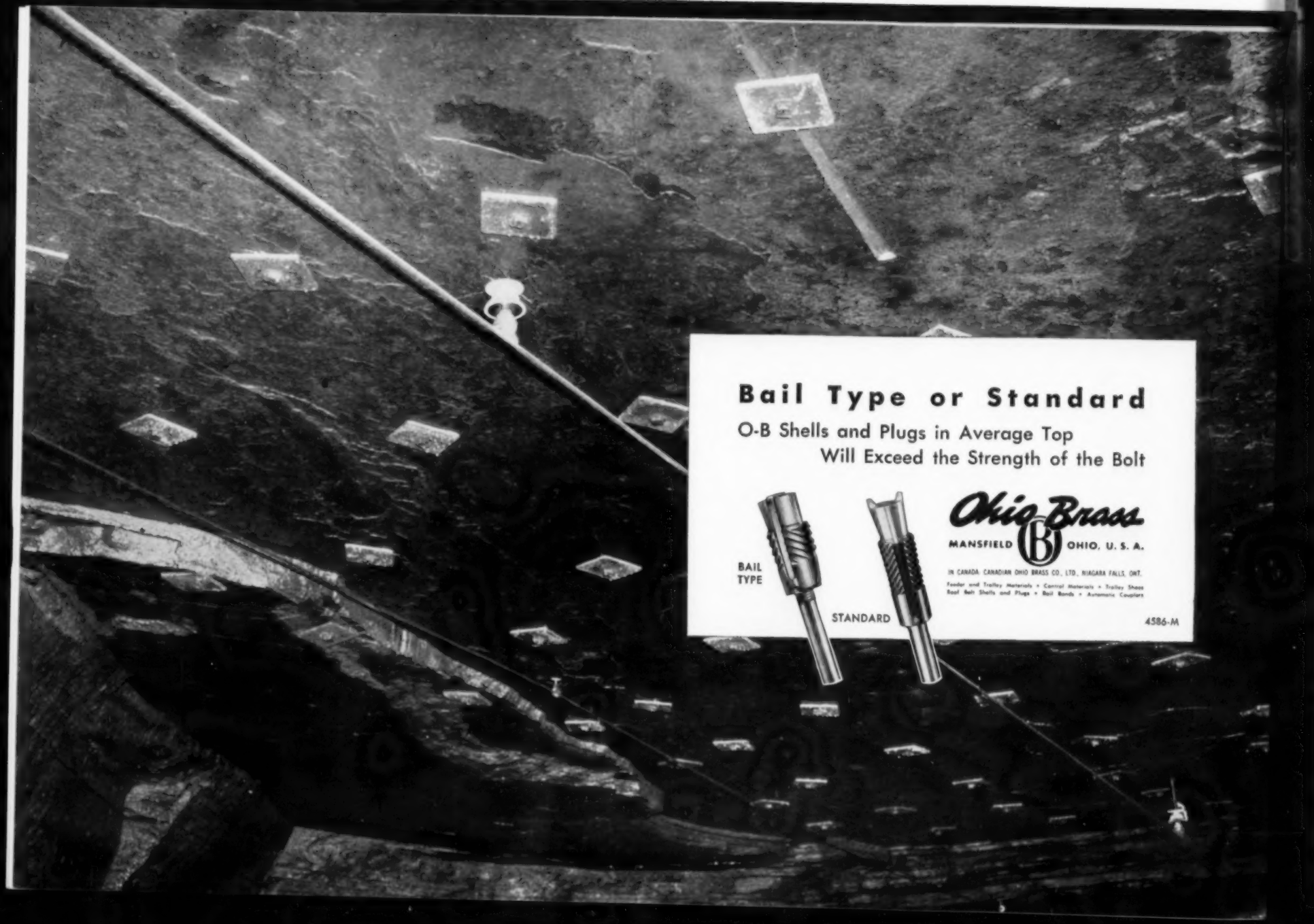
C & D Batteries, Inc., Conshohocken, Pa., has appointed William H. Krapf sales representative in the Pittsburgh, Pa., area. Mr. Krapf was formerly with Edison Storage Batteries and with Westinghouse Electric Corp.

Arthur C. Daman, president of the Denver Equipment Co., and Philip J. McGuire, director of filtration product development for the Dorr-Oliver Co., were among six alumni receiving Distinguished Achievement Medals from the Colorado School of Mines, Golden, Colo., at the 1956 commencement exercises.

General Electric Co., Syracuse, N. Y., appointed George A. Svitek, a veteran in development, design and field engineering, to fill the newly-created post of national service manager of the company's Communication Equipment Section. Mr. Svitek will be responsible for a national program of advanced training and assistance to hundreds of authorized service stations maintaining GE communication equipment.

Joy Mfg. Co. has appointed R. T. Hair, former product manager, to sales manager of the company's coal division. Mr. Hair has been with Joy since 1943 and was manager of loader and continuous miner products before his new appointment.

Lawrence L. Garber has been chosen to fill the newly created position of vice


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THERE ARE *many* brands of plastic pipe . . . some good, some not. They all *look* alike . . . except CARLON®, the best of 'em all. It's THE PIPE WITH THE STRIPE . . . guaranteed *for life* against rot, rust and electrolytic corrosion! Price is competitive, too.

Whether you use Carlon plastic pipe to carry off corrosive mine waters, or to convey water wherever you want it . . . above ground or below . . . it will never fail you as metal or inferior plastic pipe may. SO LOOK FOR THE STRIPE!

Carlon plastic pipe not only performs better and lasts lots longer . . . it's far less expensive, too. *Less* in first cost, *less* in handling cost, *less* in installation cost . . . and, of course, *much less* in lifetime cost!

See your nearby Carlon jobber for full details, or mail the coupon below TODAY!

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WORLD'S LARGEST MANUFACTURER OF PLASTIC PIPE

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We are interested in Carlon plastic pipe for coal mines. Please send more information.

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Manufacturers *(Continued)*

president in charge of production for H. K. Porter Co., Inc. He will supervise production for Porter's 13 divisions and will be situated in its Pittsburgh office. The company also disclosed that Eugene Salinger has been named general manager of Porter's Henry Disston Div., Philadelphia, Pa., to succeed Mr. Garber.

Kenneth N. Baker has been appointed assistant manager of Hercules Powder Co.'s Birmingham office to succeed Allen S. Crowley. Mr. Crowley has been moved to the company's Joplin, Mo., office.

Reagan Equipment Co., New Orleans, La., will sell and service Michigan tractor shovels and excavators' cranes.

Lewis C. Black has been appointed sales manager of large machines for Bucyrus-Erie Co. Mr. Black succeeds R. M. Dickey, who resigned April 15. Mr. Black will be responsible for domestic sales of quarry and mine machines, walking draglines, shovels and cranes.

Farmers Supply Co., Paintsville, Ky., is an authorized carbide mining tool distributor for Carboloy Dept., General Electric Co., Detroit, Mich.

Charles M. Scholz has been elected a vice president of Thermoid Co., Trenton, N. J. Prior to his election, Mr. Scholz had been assistant to the president in a sales coordinating capacity. Before that he had been assistant general manager of Thermoid's industrial rubber division.

Dorr-Oliver has appointed Equipment Engineers, Wynnewood, Pa., its exclusive representative for industrial pumps in eastern Pennsylvania, northern Delaware and southern New Jersey. The appointment marks the first time that responsibility for the sale of D-O pumps has been established on a local level. Dorr-Oliver says it expects to conclude similar agreements in other industrial areas.

EQUIPMENT APPROVALS

Twelve approvals of permissible equipment were issued by the U. S. Bureau of Mines in May:

Joy Mfg. Co.—Type WL80, Model 258V2 semi-portable air compressor; one motor 25 hp, 250 v, DC. Approval 2-1141, May 2.

Joy Mfg. Co.—Type XB24/30RIN 24-in extensible belt conveyor; three motors, one 25 hp, two 15 hp, 3-phase, 50 cycles, 500 v, AC. Approval 2-1142A, May 3.

Gallis Electric & Machine Co.—Rebuilt Joy 11BU-11APE loader; two motor, one 50 hp, one 4 hp, 250 v, DC. Approval 2-1143, May 3.

Acme Machinery Co.—Model 240-SPRA air compressor; one motor, 50 hp, 230 v, DC. Approval 2-1144, May 4.

Joy Mfg. Co.—Type 14BU-8CHH (modified by SBM1283) loading machine; five motors, two 7½ hp, two 15 hp and one 4 hp, 3 phas, 50 cycles, 415 v, AC. Approval 2-1145A, May 8.

Joy Mfg. Co.—Type RBD7 roof-bolting drill; one motor, 15 hp, 250/500 v, DC. Approvals 2-1146 and 2-1146A, May 8.

Joy Mfg. Co.—Type X831-2 crawler tail assembly for 36 in conveyor belt; one motor, 15 hp, 500 v, DC. Approval 2-1147A, May 9.

Sanford-Day Iron Works — Austin Brownie pump; one motor, 5 hp, 230 v, D.C. Approval 2-1148, May 9.

Acme Machinery Co.—Model 130-6-R portable air compressor; one motor, 25 hp, 230 v, D.C. Approval 2-1149, May 18.

Joy Mfg. Co.—Types 10SC11BPF-2 and 10SC11BPXF-2 (modified by SBM 8808 and SBM8809) cable reel shuttle cars; five motors, three 15 hp, two 7½ hp, 500 v, D.C. Approvals 2-1111A, May 22. (Approval 2-1111 covering 250-v shuttle cars of this type was issued to Joy Mfg. Co. Dec. 15.)

Joy Mfg. Co.—Types 9SC2BPE-2 and 9SCBPXE-2 cable reel shuttle cars; three motors, each 15 hp, 250 v, D.C. Approval 2-1150, May 23.

Joy Mfg. Co.—Type WK82, Model 240R portable air compressor; one motor, 3 phase, 60 cycles, 440 v, AC. Approval 2-1151A, May 28.

In addition to the permissible equipment approvals, the USBM issued the following acceptance designations to cover certain conveyor belts that have met the requirements of schedule 28 fire-resistant qualities:

Quaker Rubber Corp.—Acceptance designation 28-11 to cover 5-ply, 28-oz; 4-ply, 32-oz (without breaker strip); 4-ply, 42-oz; and 4-ply, 32-oz "Ebonite Fire Retardance" conveyor belts, May 9.

Cincinnati Rubber Mfg. Co.—Acceptance designation 28-12 to cover 4-ply, 32-oz "Fire-Resistant Cincinnatus" conveyor belt, May 24.

Thermoid Co.—Acceptance designation 28-13 to cover 4-ply, 42-oz and 4-ply, 24.5-oz cotton warp-nylon fill (Nos. 42 and 540) "Thermocoal" fire-resistant conveyor belts, May 31.

Ten other belts, the products of five companies, were also added to the list of accepted belts by extensions of acceptance designations.

From Every Angle . . .

HUBER-WARCO 5D-190 GRADER

Scores on Haul Road Building and Maintenance



The Huber-Warco 5D-190 motor grader has proved to be a sensational performer on jobs that require top grader performance, such as the building and maintaining of important haul roads. Power for this 31,450 pound motor grader is supplied by a 195 h.p. GM-6-71 diesel engine. The power and weight are in perfect balance in order to give the highest working efficiency to the grader.

An Allison torque converter multiplies torque hydraulically and protects the unit from shock loads, thereby increasing the life of the engine and equipment.

A full power-shift transmission — WITHOUT CLUTCH—permits quick shifts under full load, without interrupting the power flow from the engine to the load. A tail shaft governor automatically adjusts engine RPM to meet any load condition, at any speed set by the operator.

Exclusive with Huber-Warco motor graders is the completely hydraulic cab-controlled blade movement which permits the blade to be moved from 90° on one side to 90° on the other, without leaving the cab. The rotating saddle design eliminates linkages to adjust manually in bank-sloping operations.

A power sliding moldboard is standard equipment on the 5D-190—there's no deviation from the line of travel. Other important features include: full 360° blade rotation without removing scarifier teeth; four wheel brakes are standard; high front and rear axle clearance; wheels and tires are interchangeable.

These power and performance features have been combined to increase the working capacity of the 5D-190 and reduce costly down-time. With this motor grader it is possible to move more material with fewer passes. This increased working capacity will add more profit to every job.

Other Huber-Warco torque converter grader models include the 6-D and 7-D series. Models with standard transmission include the 4D-75, 4D-85 and 4D-115. For a demonstration—see your nearest Huber-Warco distributor.

For a demonstration — see your nearest Huber-Warco distributor

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HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

READ WHY SO MANY MINING MEN SPECIFY BOSTON HOSE AND BELTING

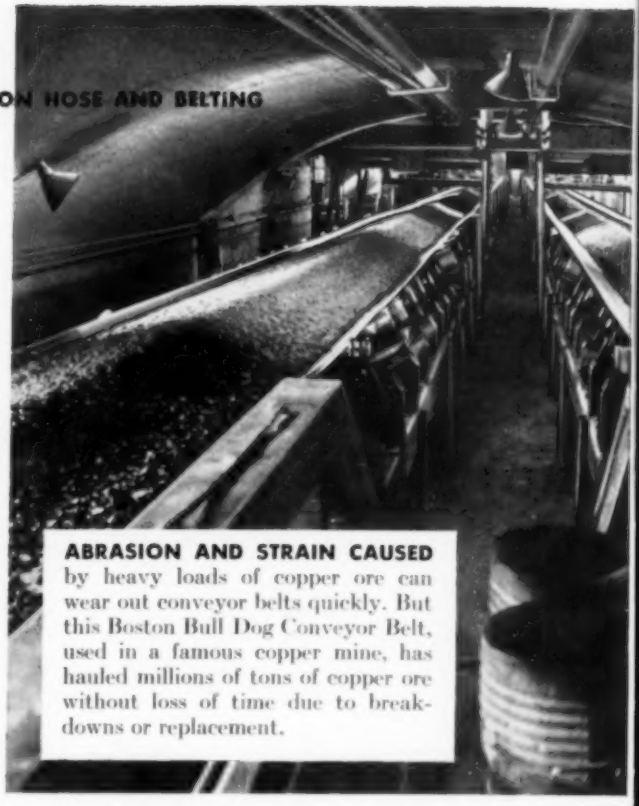
How to boost your production and reduce breakdowns at the same time

BREAKDOWNS ON ANY MINING JOB WASTE VALUABLE TIME, skyrocket production costs. That's why so many mine operators, engineers and foremen specify Boston hose and belting. They know Boston products help boost production by eliminating costly breakdowns and adjustments. Even on the very tough jobs, Boston hose and belting turn in performance you can rely on!

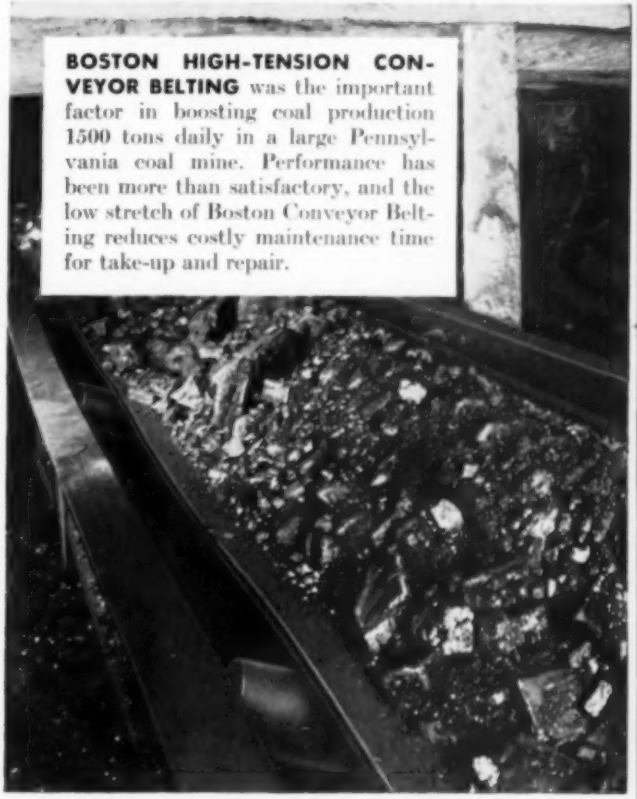
WHY SO RELIABLE? There's good reason. Boston specializes in industrial rubber products. *It's not just a sideline.* Boston Woven Hose & Rubber Company has one aim: to continue developing industrial rubber products that will outperform all others on the job.

SPECIALISTS IN GOOD SERVICE, TOO. Immediate delivery is no problem for your Boston Distributor. With his thorough knowledge of mining operations and industrial rubber products, he anticipates your needs, prepares to meet them. Better call your local Boston Man today!





ABRASION AND STRAIN CAUSED by heavy loads of copper ore can wear out conveyor belts quickly. But this Boston Bull Dog Conveyor Belt, used in a famous copper mine, has hauled millions of tons of copper ore without loss of time due to breakdowns or replacement.



BOSTON HIGH-TENSION CONVEYOR BELTING was the important factor in boosting coal production 1500 tons daily in a large Pennsylvania coal mine. Performance has been more than satisfactory, and the low stretch of Boston Conveyor Belting reduces costly maintenance time for take-up and repair.

INDUSTRIAL HOSE • FIRE HOSE • BELTING • V-BELTS • PACKING



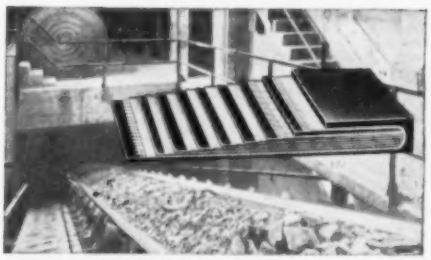


MATTING • TAPE

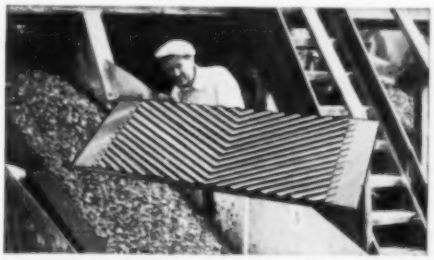
BOSTON CHECKLIST FOR YOUR HOSE AND BELTING REQUIREMENTS



BOSTON HIGH-TENSION BELTS: Cut your operating costs on long center and high lift conveyors with Boston High-Tension Belts. They need fewer, lighter plies to carry heavy loads. Boston's Rotocure process makes this possible by eliminating mechanical distortions and uneven stretch.



BOSTON CONVEYOR BELTS: Specific job engineering for length of haul and type of load means Boston belts give you outstanding performance on every job. One Boston Silver King Belt still serves a major coal company in Virginia after 20 years (the original drive wore out after 15 years).



BOSTON CUSTOM CONVEYOR BELTS: On special applications, Boston's know-how teams up with Boston's Rotocure process for job-right performance. One specially engineered Boston belt, used by a large iron mine on the Mesabi Range, lasted five times longer than competitive belts!



BOSTON TRANSMISSION AND V-BELTS: You get increased operating efficiency wherever you use Boston Transmission and V-Belts because they are specially designed to eliminate slippage, require fewer adjustments. That means fewer breakdowns, less wear and tear on motors.



BOSTON HOSE: Your Boston Man has a complete line of air hose, water hose, face hose and rock-dusting hose designed and engineered by Boston to give you superior performance, even on the tough jobs. His experience will help you pick the right hose for every application.

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NEW NCA PRESIDENT—L. Newton Thomas (left), president, Carbon Fuel Co., poses with Tom Pickett, retained as executive vice president, and L. C. Campbell, vice president, Eastern Gas & Fuel Associates, who stepped down after four terms as president of the association.

How Coal Serves The Nation

NCA's 39th Anniversary Convention, Washington, D. C., June 13-14, analyzes coal's problems and opportunities; proposes aggressive campaigns to realize coal's expanding future in electric power, steel, chemical and export markets.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

INCREASING AWARENESS of coal's vital position in the economic life of the nation and the world dominated sessions of the National Coal Association's 39th anniversary convention, held June 13-14, at the Shoreham Hotel, Washington, D. C.

Outstanding industrial leaders spoke on coal's future in the electric power, steel, and chemical markets and on its competitive status in nuclear energy development. Elliott V. Bell, publisher, *Business Week*, discussed the business implications of Soviet Russia's tactical shift to the "Economic Battlefield." Walter J. Tuohy, president, Chesapeake & Ohio Ry., announced the formation of American Coal Shipping, Inc., to promote coal's export trade (p 122). NCA business (p 145) was highlighted by the election of a new president—L. Newton Thomas, president, Carbon Fuel Co.

Stanley B. Johnson, Jr., chairman, 1956 NCA convention committee, called the convention to order. After Rev. Frederick B. Harris, chaplain, U. S. Senate, gave the invocation, Mr. Johnson introduced the morning's presiding officer, Kenneth A. Spencer, president, Pittsburg & Midway Coal Mining Co.

Coal and the Nation

L. C. Campbell, retiring president, keynoted the convention with the statement "that coal may well be entering its golden years." Continuing, he called attention to increasing awareness of the industrial might of coal and its well-deserved place in the economic life of America. This awareness embraces not only the coal industry and its customers but also transportation interests and government groups. Marking the rise in coal production from 392 million tons in 1954 to 470 million in 1955 and predictions of a 500 millon ton total for 1956, Mr. Campbell called increasing demands for coal a "challenge to the industry" but warned against any "tendency to over-optimism."

"There is need for caution," he said, "only to the extent that everyone understands that in a vast extractive industry like the coal business, replacement of plant, of obsolescent equipment, and expansion of capacity, must be met with adequate financial return.

"I believe that we can indeed look forward to an ever-improving position for coal that ought to be pleasing to the industry; to the railroads and other transportation which moves the coal; and to the customers in their expanded use of coal; as well as to a comfortable feeling to those in the federal government who praise the ability of our vast industrial machine to carry on, not only in times of peace but in times of war."

Mr. Campbell enumerated several requirements for proper industry response to growing demands for coal, including dependability of coal supply, an adequate supply of coal hopper cars, and more engineers to relieve the growing shortage of technical manpower requirements in the industry.

Following Mr. Campbell, Tom Pickett, NCA executive vice president, declared that the bituminous coal industry can expect to share fully in the rapidly expanding energy market created by ever-increasing demands for goods and services. "Coal's vast reserves, far exceeding those of competitive fuels in this nation, are expected to supply an increasing share of the energy requirements to power the nation's progress," Mr. Pickett declared. "This is testified to by government and industry as they analyze future demands."

The future of coal is brightened by the growing need for energy for electric generation, for steel production, for general industry, and the need for coal as a raw material for chemicals and synthetics, and for conversion into liquid and gas. But no one should expect an undeviating, unbroken expansion of coal production in the future, Mr. Pickett warned. There will be peaks and valleys, he said, "but it would be unreasonable" to anticipate new lows "in the foreseeable future."

"As we participate in the nation's progress, we must seize the opportunities offered, and work cooperatively to secure impartial treatment from government and consumers," Mr. Pickett asserted. The industry must strive for greater efficiency and economy of production to keep costs competitive, but at the same time "establish and maintain a reasonable return and fair profit for its product."

Coal and the Atom

Nuclear energy has a vast potential as a new source of energy for the world and the United States, W. Kenneth Davis, director, AEC reactor development, stated in the next address. As an energy source, however, nuclear power has severe limitations as well as advantages and thus will not compete substantially with energy sources such as coal and oil for many of the large and growing energy demands of the future. Mr. Davis' paper was pre-

NCA BUSINESS

OUTLINING ITS PROGRAM for the coming year, NCA resolved to continue working with the railroads in improving car supply, and to push legislative action with appropriate federal government bodies for:

1. Controlling the import, export and domestic sale of natural gas where these transactions affect the best long-term interests of the Nation and the coal industry.
2. Granting the coal industry a more equitable rate of percentage depletion.
3. Advancing an adequate research and development program for the coal industry.
4. Expediting the issuance of a uniform government fuel purchasing policy.
5. Holding the import of residual fuel oil at least to the level of the 1954 ratio furmula.
6. Reducing crude oil imports to a level which will guarantee adequate incentive for domestic oil exploration and development.
7. Discouraging a "crash program" for the development of electric generation from nuclear power as proposed in S. 2725.
8. Collecting and disseminating more adequate monthly data on the regional and national production and distribution of coal.

On the election slate, NCA members named as their new president, L. Newton Thomas, president, Carbon Fuel Co.

Vice presidents elected are:

Harry LaViers, president, South-East Coal Co.

H. Vernon Frichtman, vice president, Rochester & Pittsburgh Coal Co.

James W. Morgan, president, Ayrshire Collieries Corp.

Kenneth A. Spencer, Pittsburg & Midway Coal Mining Co.

Tom Pickett was re-elected executive vice president, and other officers were re-elected as follows:

Carl C. Crow, secretary and assistant treasurer. John L. Kemmerer Jr., vice president, Wise Coal & Coke Co., treasurer.

New directors are:

C. R. Bourland, president, New River Co.

Mark Eastin Jr., president, West Kentucky Coal Co.

Oscar Glaeser, vice president, United States Fuel Co.

T. L. Kelce, executive vice president, Southern Coal Co.

Ralph H. Moore, president, C. A. Hughes & Co.

S. F. Sherwood, president, Sherwood-Templeton Coal Co.

Other NCA directors include:

Joseph T. Berta, president, Pittston Clinchfield Coal Sales Corp.

J. S. Besser, sales manager, fuel, Colorado Fuel & Iron Corp.

D. W. Buchanan Jr., president, Old Ben Coal Corp.

L. C. Campbell, vice president, Eastern Gas & Fuel Associates.

S. Austin Caperton, president, Slab Fork Coal Co.

Newton H. DeBardeleben, president, DeBardeleben Coal Corp.

S. J. Dickenson, secretary-treasurer, Mary Helen Coal Corp.

C. C. Dickinson, president, Dickinson Fuel Co.

George E. Enos, president, The Enos Coal Mining Co.

J. D. Francis, president, Powellton Coal Co.

H. Vernon Fritchman, vice president, Rochester & Pittsburgh Coal Co.

Otto Gressens, chairman, finance committee, Peabody Coal Co.

Charles R. Griffith, president, Southern Coal & Coke Co.

C. A. Hamill, president, Sycamore Coal Co.

W. D. Hamilton, coal mines manager, Saginaw Dock & Terminal Co.

H. R. Hawthorne, general counsel, Pocahontas Fuel Co.

R. L. Ireland, chairman of the board, Hanna Coal Co.

W. J. Johnson, president, The Roundup Mining Co.

Herbert E. Jones, president, Amherst Coal Co.

L. Russell Kellee, president, Peabody Coal Co.

John L. Kemmerer Jr., vice president, Wise Coal & Coke Co.

S. A. Kendall Jr., president, Stanley Coal Co.

R. H. Knode, chairman of the board, Stonega Coke & Coal Co.

Frank F. Kolbe, president, United Electric Coal Cos.

Harry LaViers, president, South-East Coal Co.

George H. Love, president, Pittsburgh Consolidation Coal Co.

F. M. Medaris, president, Harvey Coal Co.

James W. Morgan, president, Ayrshire Collieries Corp.

Frank Nugent, executive vice president, Freeman Coal Mining Corp.

Charles A. Owen, chairman of the board, Imperial Coal Corp.

M. L. Patton, vice president, Truax-Traer Coal Co.

W. T. Ray, president, Meadow Creek Coal Co.

W. H. Ritter, president, Reitz Coal Co.

R. E. Salvati, president, Island Creek Coal Co.

Henry P. Smith, president, Princeton Mining Co.

K. A. Spencer, president, Pittsburg & Midway Coal Mining Co.

L. Newton Thomas, president, Carbon Fuel Co.

Laurence E. Tierney Jr., president, Eastern Coal Corp.

Richard T. Todhunter Jr., general manager, Barnes & Tucker Co.

Whitney Warner Jr., president, Warner Collieries Co.

Henry C. Woods, chairman of the board, Sahara Coal Co.

Battle Honored

Following announcement of his retirement from active participation in association affairs, John D. Battle, former executive vice president and recently special assistant, was honored at the annual banquet June 14 by special tributes and a standing ovation.

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sented by Louis H. Roddis Jr., AEC's deputy director, reactor development.

Nuclear energy can be expected to become an important source of electric power during the next 25 yr not only in the United States but in many areas of the world. It can be expected that nuclear power will replace some of the expanding fuel demand that might otherwise be filled by burning coal. However, it does not appear likely that this will seriously affect the increasing demands for coal or other conventional fuels.

The federal government, through the AEC, is pushing an aggressive research and development program intended to provide the technological basis for industrial commercialization of nuclear power. The number of different types of reactors being developed is consistent with the overall requirements of an embryonic but broad nuclear power industry and looks toward use of nuclear power for various heating and process uses.

The participation by American industry in the overall program is expanding very rapidly and the commission's belief that they can and should make the practical economic applications justifiable.

Atomic energy will have many as yet unforeseen effects upon our daily lives and upon our industries. It seems certain that this impact will be to the ultimate benefit of every segment of our economy. "We who are engaged in this effort hope that you will share in our enthusiasm for this great project which we are endeavoring to conduct within the traditional principles of our democratic form of government."

Coal and World Trade

The formation of American Coal Shipping, Inc., was announced by Walter J. Tuohy, president, Chesapeake & Ohio Ry., at Monday's luncheon session sponsored by the Coal Exporters Association of the U. S. (News Section, p 122). S. P. Hutchinson, president of the association and executive vice president, General Coal Co., presided.

Coal and Electric Power

With continuous and expanding research, coal can gain and hold its fair share of America's growing energy market, declared John W. Evers, addressing the Thursday morning session. Roland C. Luther, vice chairman, 1956 NCA con-

COAL EXPORTERS MEET

U. S. COAL EXPORTS can go ultimately to the level of 100 million tons a year, Walter J. Tuohy declared, addressing the luncheon session of the Coal Exporters Association of the United States, Inc. Mr. Tuohy's talk and announcement of the formation of American Coal Shipping, Inc. (p 122), highlighted the Wednesday luncheon and afternoon meetings of the coal exporters' group.

The afternoon business session opened with welcoming remarks by S. P. Hutchinson, CEA president, and by Tom Pickett, NCA executive vice president. A feature of the session was the progress report by F. F. Estes, the export association's executive secretary. Mr. Estes said that the "work and effectiveness of the association has enlarged, it is financially stable, and is today the recognized and sole spokesman for the exporting branch of the coal industry."

Monthly exports during the last 6 mo of 1955 and the first 3 mo of 1956, Mr. Estes remarked, are running at an annual rate of 42.6 million tons, only a few million tons below the record exports shipped during the calendar year 1947. "It is entirely possible that calendar year 1956 exports could top those of 1947, and establish a new record."

W. P. Anderson, chairman of CEA's Transportation Committee, urged all shippers to tidewater piers "to see that their whole organizations appreciate the absolute necessity of diligent attention to tidewater shipments so as to avoid delays to cars." Only by such effort is it possible to escape a share of the blame for car shortages and to avoid "the dead hand of regulative bureaucracy." Mr. Anderson said that the CEA would continue its work with the Tidewater Demurrage Committee of the railways to improve demurrage costs.

CEA's slate of officers and directors remains the same for the coming year. Present officers are:

President—S. Pemberton Hutchinson, executive vice president, General Coal Co.

Vice President—A. F. Kempe, president, Seneca Coal & Iron Corp.

Treasurer and general counsel—James W. Haley, vice president, Jewell Ridge Coal Sales Corp., and Virginia Smokeless Coal Co.

Executive secretary—F. F. Estes, Washington, D. C.

Assistant secretary-treasurer—Mildred M. Loveless, Washington, D. C.

Present directors are:

W. H. Carpenter, president, Dexter-Carpenter Coal Co.

H. A. Damcke, consulting manager, Island Creek Coal Sales Co.

S. Pemberton Hutchinson, executive vice president, General Coal Co.

A. F. Kempe, president, Seneca Coal & Iron Corp.

D. K. Mackenzie, vice president, Castner, Curran & Bullitt, Inc.

P. F. Masse, vice president, C. H. Sprague & Son Co., Inc.

J. R. Maust, president, Saljoan Coal & Coke Corp.

George McCree, president, Maritime Coal & Coke Corp.

C. A. Owen, chairman of the board, Imperial Coal Corp.

J. S. Routh, chairman of the board, Routh Coal Export Corp.

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vention committee, introduced the presiding office, Henry G. Schmidt, president, The North American Coal Corp.

Mr. Evers, president, Commonwealth Edison Co., said "that evidence is mounting that coal can increase its share of the electric energy market at the expense of oil, gas and hydro-power. Undoubtedly, it will gradually lose a share to nuclear fuel. But, on the balance, even the atomic energy scales will be tipped in favor of coal for at least 10 to 20 yr."

Expanding research should go hand in hand with expanding use of coal, Mr. Evers stated. Such research should be aimed primarily at the many problems faced jointly by the coal and utility industries—such problems as transportation, utilization, purification, gasification and all the others. But, it should by no means be limited to coal-utility problems. It should cover all of coal's problems—modernization, mechanization, automation, markets and new uses.

Coal needs of the electric power companies should increase to 210 million tons in 1965 and to 460 million tons in 1975 (compared to 140 million tons in 1955). But, Mr. Evers warned, "the coal industry, of course, cannot just sit back and wait for these orders to pour in. It will have to work for them. It will have to pay more attention to servicing its customers—to making good on its representations with respect to Btu values, shipments, type and quality of coal. It will have to continue its programs of research, modernization and mechanization to hold down costs and prices. This must include a continuous guard against rising transportation costs which, in recent years, have all but nullified the success of your own efforts."

Coal and Steel

During the next 3 yr, the steel industry is adding 15 million tons of capacity which will require an additional 9 million tons of coke. Approximately 12 million tons of coal will be needed to produce this much coke, stated Charles R. Hook, chairman, Armco Steel Corp.

The expanding economy has set a pattern of constant growth in the steel industry. Iron and steel companies used to complete one expansion project and then let some time elapse before starting another. "Our outlook is altogether different today. We realize that to supply the growing market for steel we must view expansion as a continuous process just like our operations."

Mr. Hook told the assembled conventioneers that coke is in an impregnable position in the blast furnace as it supplies carbon as well as heat. There are no metallurgical developments which challenge the present processes for making pig iron and steel, nor is there anything in sight that might replace coke in the blast furnace.

Roughly 1 ton of coal is required to make 1 ton of pig iron or "hot metal." Approximately ½ ton of pig iron is used to make a ton of steel ingots. The trends in the near future in steelmaking will be toward less coke per ton of pig iron and more pig iron per ton of steel. Although these two developments will tend to offset one another, there will be a greater demand for coking coals as steelmaking capacity is expanded.

Coke consumption per ton of pig iron is being reduced steadily as blast furnaces are being filled with more high-grade iron ores from Labrador and Venezuela and concentrated iron ore pellets produced from taconite. The resulting increased blast-furnace output is a welcome development to the steel industry, limited as it is in the financing of expansion. On the other hand, there is a strong movement toward the use of more pig iron per ton of steel. Rising pig iron demand spells more coke.

One of the principal factors behind the trend for more pig iron is the oxygen converter process. This is a new steelmaking process, known as the Linz and Donawitz, or simply as the LD process. The oxygen converter is attracting attention for two reasons. It uses 75 to 80% pig iron in its charge compared with an average of 50% in the open-hearth practice. And it can be built at approximately 50 to 60% of the cost of an open-hearth furnace.

One American and one Canadian steel company have converters in operation and three more American companies are planning large installations. Here is a trend well worth watching, because it will have a strong effect on the metallurgical coal market.

In addition to more high-quality coking coals, the steel industry will need increasing tonnages of coal for taconite processing. About 81 lb of bituminous coal are required to supply the power to process 1 ton of taconite. A smaller amount of anthracite is needed for pelletizing. Production of taconite pellets will be climbing for the next 25 yr, and the demand for coal will go right along with increased output. It has been estimated that production of taconite pellets will reach 40 million tons by 1980. This rate of output will require more than 1.5 million tons of bituminous coal annually.

Process steam consumption of steel plants is another item that seems to be growing. The coal industry can gain a lot of ground here where it is competitive with other fuels. Armco's Middletown plant has doubled its process-steam con-

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NCA Convention *(Continued)*

sumption within the last 5 yr.

And last, but not least, the steel industry's tremendous power requirements are growing every day. In 1955, the industry consumed 34.8 billion kwhr of electricity —a record year. The proposed 15-million-ton increase in steelmaking capacity will boost the industry's power needs more than 11%, adding another 3 billion kwhr to the total load.

Many coal companies have done a fine job of increasing their productivity and upgrading the quality of their coals by installing new mining equipment and coal washing facilities. Mechanization is important, but it can be over-emphasized. Along with the machinery, industry needs fully informed employees.

"We often demand higher production and improved quality from employees, but we don't tell them why we need these things. We worry ourselves about costs, but we don't go directly to the people who can help us a lot in controlling costs—employees."

Coal and Business

Soviet Russia has "boldly challenged" the United States in its own field of supremacy—the field of economic progress, Eliott V. Bell, publisher of *Business Week*, told the Thursday luncheon session, presided over by L. C. Campbell, NCA president. Mr. Bell said that throughout the world people want all of the things that have contributed to the American way of life. "And who is it that steps forward and offers to help them get it?" he asked. "Communist Russia."

"The Communists have been quick to seize upon the world-wide desire for a better life," Mr. Bell said. "They have shifted their tactics in the battle for men's minds from military aggression to economic enticement."

Mr. Bell cautioned against underestimating the enemy on the economic battlefield. In this economic war, the Communists have important advantages. Soviet resources can be disposed of according to the dictates of national policy. The Soviet leaders do not have to wait for public opinion to catch up with events; they do not have to contend with lobbying of particular groups, seeking to protect particular privileges. Despite Russia's low living standard, the Communists can both purchase and provide goods in foreign trade as suits their game.

Mr. Bell said that "a tide of economic isolationism" rising in the United States has created a more difficult problem than was faced in the earlier phase of the cold war. He admitted the attractiveness of the isolationist dream, but said it was "alas, only a dream. The world has shrunk, our ocean barriers are only rivers. The Communist nations now cover two-thirds of Europe and Asia and embrace over one-third of the people of the world. We cannot wish them away; they are there—threatening our happiness and freedom even when as now they smile and joke and pretend to want nothing but our friendship."

An isolated America, even if it were possible, could only be a shrinking, backward-looking America. Expanding America depends upon resources from overseas. Mr. Bell mentioned iron ore, manganese, chrome, tin, nickel, petroleum bauxite, lumber, zinc and copper as some of the foreign raw materials that the U. S. will need in growing quantities. But he added that "fortunately, much of the world is also dependent upon us." The U. S. is a primary market for Canadian newsprint, Portuguese cork and Chile's nitrate while "Western Europe will be heavily dependent upon American coal for as far ahead as we can see."

The U. S. has now discovered that foreign aid is permanent. To many Americans, this sounds shocking. Yet, in fact, foreign aid has actually been a regular part of our American economy since the earliest days. Then it took the form of emigrant remittances—more recently it has been Government aid.

"We live in an interdependent world. If we will recognize that and act accordingly, we need not fear the outcome of the economic battle to which Russia has challenged us."

Mr. Bell paid tribute to the bituminous coal industry for the extraordinary record achieved in the past few years. He said that "today, the bituminous coal business is being analyzed and written about in

. . . WITH MEN WHOSE JOB IT IS TO GET THE COAL OUT

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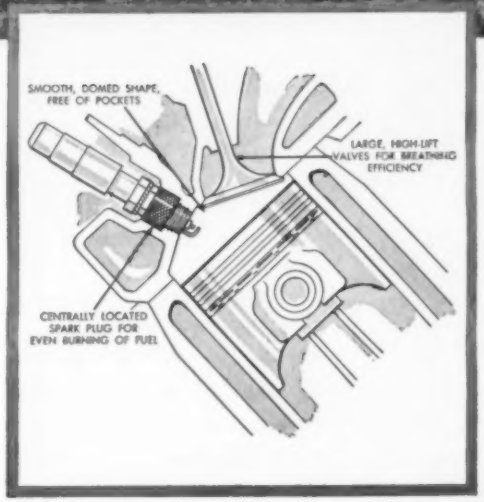
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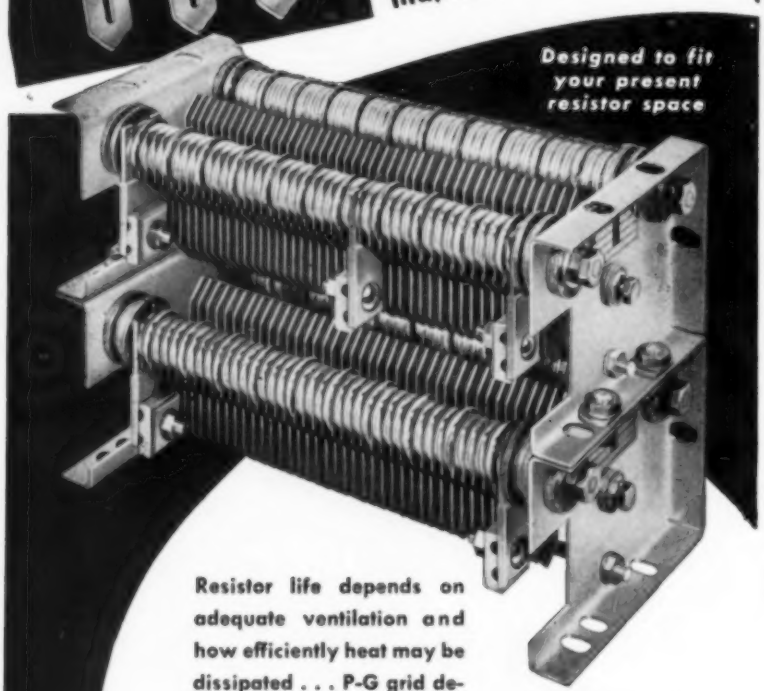
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NCA Convention *(Continued)*

Wall Street as one of our growth industries with a tremendous expanding future before it."

More and more businesses are finding out that improved human relations are a big asset in producing higher-quality, lower-cost goods. The most successful managers in any business today are those who spend the larger part of their time on human problems. They tell their employees about the problems of management, and the fundamental economics of business. They are taking the mystery out of business.

"Almost everywhere we look we can see new avenues opening for both coal and steel. But our new opportunities will also bring problems, of course. The problems, although different in character in our two industries, will be greatly similar in principle. No matter what they may be—questions of new markets, lower production costs, improved quality—all can be reduced in the final analysis to dependence on people. And we must look to management to create and maintain the kind of atmosphere in which people are the first consideration."

Coal and Chemicals

Economic solution to the problems of commercial hydrogenation of coal is now very close, Dr. Joseph Davidson, vice president, Union Carbide & Carbon Corp., told the Thursday afternoon session. Stanley B. Johnson introduced the session's presiding officer, Newton H. DeBardeleben, president, DeBardeleben Coal Corp. "It probably will be another year or so before we can finally run up the flag again, but I think by that time we will be able to do it," Dr. Davidson added.

The minimum size hydrogenation plant should process 1,000 tpd of coal; the maximum size may handle 3,000 to 6,000 tpd, Dr. Davidson indicated.

A 1,000 tpd plant, with all of its facilities would require an investment of $50 million to $100 million. Such investment requires men of vision and daring. It also requires, of course, men of understanding and brilliant management who have the ability and willingness to invest large sums of money which will return to them slowly, and perhaps, in some cases, not at all."

Dr. Davidson made a strong plea for the coal industry to invest greater sums of money in research and development. The petroleum and chemical industries spend $146 million and $360 million a year, respectively, on research. By contrast, he pointed out that the coal industry spends only about $17 million a year.

Forcing home the merits of research, Dr. Davidson said that Union Carbide's Chemical and Bakelite Div., formed in 1921, now accounts for 60% to 65% of the company's total income.

"It would seem to me that it might be possible to do more things for yourselves." Dr. Davidson cited the work of the petroleum and chemical industries in developing cheaper methods of trans-

(Continued p 176)





Diagram showing magnetic field for 2-coil, 36-in.-dia., 42-in.-wide pulley. Note how magnetic field blankets entire load.

New magnetic pulley stops tramp iron riding the load peaks

This new Stearns 2-coil electro-magnetic pulley effectively removes tramp iron riding the crest of a conveyor load as well as the pieces that pass close to the magnet's face. Two-coil design produces a powerful magnetic field that is deepest at the center of the conveyor belt where load is heaviest. Thus, the area of magnetic attraction is the same general shape as the load on a conveyor operating under standard conveyor practices.

Smaller, lower-cost pulleys now practical

Because of the nature of the magnetic field, smaller pulleys costing less can now be used on jobs where larger units were formerly needed. An examination of data on a number of proposed installations showed that, in the majority of cases, the recommended new 2-coil pulley was of smaller diameter than a 3-coil pulley of comparable ability.

New, simple pulley selection method*

Because this pulley fits right into recommended conveyor standards for speed of belt travel and depth of load for various types of materials, it is far simpler to select the right pulley than ever before. Stearns provides new selection tables in Bulletin 303-C that now make it possible for you to select the right size unit for your job even before you consult our sales engineers.

Get all the facts on this new magnetic pulley. Find out how it simplifies pulley selection. Write for Bulletin 303-C.

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Yet — *after ten days* — the cable and shovel it supplied continued to operate! Later, the cable was relocated—and is still giving service.

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Safety and economy of Anaconda cables have been proven in mines all over the world. The *Man from Anaconda* will be glad to help you on any cable problem. For cable, see your Anaconda distributor. And for copy of booklet, "*. . . and the wall came tumbling down*," write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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Sharp corner of rock caught and held taut the Anaconda Shovel Cable – but didn't break it.



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Like a guillotine, yet tons of rock did not puncture cable nor interrupt flow of power to the shovel.



Rockfall crushed and partially buried the cable all along its length – but not a single break occurred.

ANACONDA® MINE CABLE





OPENING SESSION—C. G. Evans (left), North American Coal Corp.; Hon. M. E. Sensenbrenner, mayor, Columbus, Ohio; Rev. D. S. Mills, district superintendent, United Brethren Church; Harry J. Dusz, chief, Div. Mines, Ohio, temporary chairman; Joseph Bierer, president, MIIA; C. A. McDowell, secretary, MIIA. David L. Francis (right) gave the opening keynote address. Robert Moulton, chairman, Ohio Utilities Commission, not in the picture, was also present for the session.

The Safety Job Ahead

Two hundred and four mine inspectors from 22 states meet in Columbus, Ohio; demand action to:

- **Boost coal's safety record to the general industrial level.**
- **Handle safety problems growing out of increased mechanization.**
- **Convince management that safety is a part of the production cycle.**
- **Extend safety training and education programs.**
- **Improve on management, supervisor and miner attitudes towards safety.**

GRIM DETERMINATION to wipe out the menace of roof-fall accidents featured the 46th annual convention of the Mine Inspectors' Institute of America, June 4-6, 1956, at the Deshler Hilton Hotel, Columbus, Ohio. Highlights of the meeting also included spirited, informative talks on:

1. The coal industry's outlook and needs.
2. New developments in mine lighting.
3. The Alabama Power Co.'s experience in ventilation and dust control with continuous miners (see *Coal Age*, this issue, p 56).
4. Progress and effectiveness of wet rock dusting.
5. "Indiana's Program to Reduce Coal Mine Accidents."

Harry J. Dusz, chief, division of mines, Ohio, presided at the Monday morning assemblage which was welcomed by the Hon. M. E. Sensenbrenner, Mayor of Columbus; Robert Moulton, chairman, Ohio Utilities Commission; C. G. Evans, personnel manager, North American Coal Corp.; Joseph Bierer, president, MIIA; and the Rev. D. S. Mills, district superintendent, United Brethren Church, who gave the invocation.

Coal's Bright Future

The coal industry has a bright future if those within the industry, and friends and customers outside, will work constructively towards this objective. Thus concluded David L. Francis, president, Princess Elkhorn Coal Co., after reviewing the plus and minus factors affecting the coal industry over the next 20 yr.

Making the convention's opening address, Mr. Francis said that coal's future should include an annual output of 750 to 850 million tons by 1975. The country's electric energy needs should triple, requiring 490 million tons of coal or almost as much as total production this year.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

The export market may double from 35 to 70 million tons. Other large increases should also occur in the use of coal for producing steel, aluminum and chemicals. Even the domestic market should now have a gradual turn upward.

The growing shortage of natural gas and oil supplies means that these fuels will become less competitive, since they will be more and more reserved for premium uses. Many people have already predicted that 20 yr from now the oil and gas industry will be taking steps toward processing coal at or near the mines and putting the by-products in the pipelines that are now going across the coal fields to major markets.

In the next 20 yr, Mr. Francis said that the coal industry would become the most efficient industry in the country, if it is not so already. Plans are on the drawing board to extend and improve continuous mining, to modernize antiquated haulage and lighting systems, and to streamline preparation.

However, Mr. Francis warned, there are several outside areas where coal's house must be put in order before it can reach the prosperity necessary to attract young men to enter the industry and to gain the confidence of outside investors. He pointed, for example, to the need of educating the utilities and the federal government to change their present buying practices. This is necessary if coal is going to realize the fair profit vital to expansion investment.

Mine workers' wages are at such a peak, he also stressed, that now all increases, if any, should be from improvement in their own productivity and efficiency, not accounting for the investment in equipment. This must be accomplished through a full day's work; the elimination of wildcat strikes that have plagued our industry; the elimination of absenteeism; putting the Welfare Fund back on a sound actuarial basis, etc.

Roof Fall Accidents

Opening the Monday afternoon symposium on "How to Reduce Roof-Fall Accidents," J. J. Forbes, chairman, declared that the roof fall is still the No. 1 killer in coal mines. The MIIA president-elect and former director, USBM, requested close attention to the papers following and called for active discussion of them.

In the lead-off paper, H. J. Sloman, safety education and training officer, USBM, stressed that the roof-fall hazard is of particular concern to each person who goes underground, "from the highest official to the last workman." The reduction in roof-fall fatalities over the years has not been as impressive as the figures apparently indicate, he added. For comparative purposes, consider the years 1937 and 1955, during which the total production of coal—bituminous and anthracite—was very close. The number of employees, man-hours of employment, and productivity per worker, however, differed considerably:

	1937	1955 (tentative)
Production, tons	498,793,000	496,367,000
Employees	589,856	240,000
Man-hours	912,435,000	400,870,000
Tons per man-hour	0.55	1.24
Roof-fall fatalities	726	229

In 1937 the man-hours of employment were 2¼ times as great as in 1955, almost 2½ times as many men were employed, production per man-hour was less than half as much, and the roof-fall fatalities were 3.2 times greater. If, however, the roof-fall fatalities were considered to be in direct proportion to the man-hours of exposure, 521 would have occurred in 1955, provided the exposure had been the same as in 1937; or if the man-hours of exposure in 1937 were reduced to the same basis as in 1955, the 726 roof-fall fatalities would have been reduced to 319.

Analyzing the roof-fall problem, Mr. Sloman pointed to the basic differences in a mine roof made by nature and in a man-made building or structure. Mine roof and its supports cannot be closely designed, he said. "Mine roof does not consist of a homogeneous mass; it contains many irregularities, such as, fractures, joints, clay veins, planes of weakness, faults, slickensides, pots or kettle-bottoms, horsebacks, rolls, and other nonconformities. The stresses in the roof and on its supports can only be approximated because of the variable character of the overburden.

"When a coal bed is undisturbed by mining, the stresses in it balance each other so that the strata adjacent to the coal bed are in a state of equilibrium, and, barring a major geological disturbance, the bed and the surrounding strata usually remain 'at rest.' Once the bed is disturbed by mining the excavation creates stresses in the mine roof, and forces are set up that tend to restore the equilibrium that previously existed. The stresses or forces are transferred to the pillars and such artificial roof support as has been installed, or they are transmitted to the pillars through a reinforced area (roof bolts). If the combination is adequate to resist movement the roof will hold; if not, the roof will fall until the caving brings relief to the unbalanced stresses through natural arching or the excavation is filled and thus equilibrium is reestablished."



MONDAY AFTERNOON—Charles H. Curry (left), Pa. Dept. of Mines; C. G. Evans, North American Coal Corp.; C. E. Linkous, Island Creek Coal Co.; Charles K. Parker, Eastern Gas & Fuel Associates; Harold J. Sloman, USBM; J. J. Forbes, first vice president, MIIA, chairman.



WEDNESDAY MORNING—E. J. Gleim (left), USBM; S. P. Carter, Armco Steel Corp.; R. D. Godard and J. A. Boyle, Coal Div. U. S. Steel Corp.; James A. Hagy, Alabama Power Co.; Domenic Stanchina, Ohio Dept. of Mines; James H. Phalan, Ky. Dept. of Mines and Minerals.

Promptness in installing artificial roof supports is the key to preventing substantial unbalancing of the roof stresses. Delay in installing artificial roof supports might render inadequate the minimum standard, just as increasing the width of excavation accompanied by reduction in the size of pillars might do so.

To aid in understanding the character and magnitude of the roof-fall problem, Mr. Sloman presented three tables prepared from USBM records and reports on fatalities from falls of roof, rib and face. Among the important figures from the tables are the following:

1. Of total fatalities in 1955, 167, or 72.9%, occurred within 25 ft of the working faces.

2. If the driller-shotfirer and roof-bolter groups are included with machine operators, the machine classification of workers accounts for over 40% of total fatalities.

3. The average age of victims is 43.9 yr and the average experience is 20.3 yr—confirming that a worker's appraisal of roof-working conditions does not improve much with age and experience.

The section foreman holds the key to the roof-fall problem, Mr. Sloman asserted. But he alone cannot solve it. Top management must convince him that it is sincere in believing that safety, including roof control, is considered an integral part of the production cycle.

The job ahead in controlling roof falls will be intensified by growing mechanization because of:

1. The noise of machinery, which may obliterate for the workmen the sound of "working roof."

2. The rapid rate of advance, which is accompanied by rapid changes in roof conditions.

With all of its imponderables, the roof-fall problem can be solved if an honest attempt is made to do so. Four cardinal points are:

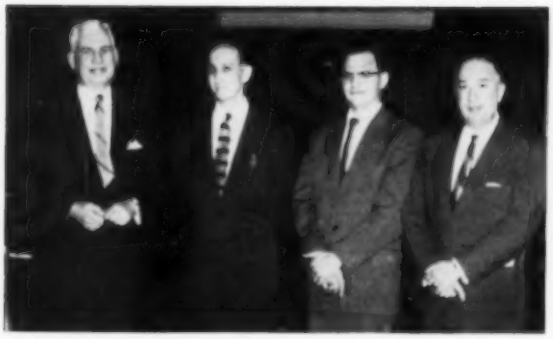
1. Support the roof, never using less than that called for by the minimum standard but using more as necessary.

2. Remember that no job or operation in a coal mine is more important than providing adequate roof support.

3. Never forget that promptness in removing loose roof or installing support is the key to avoidance of roof falls.

4. Reduce exposure to unsupported roof.

The success of roof-bolting, according





WEDNESDAY AFTERNOON—J. W. Woomer (left), J. W. Woomer & Associates; Dr. Irving Hartman and J. K. Rauschenberger, USBM; Wayne D. Snell, Coal Div.; U. S. Steel Corp. In right picture, A. D. Sisk (left), Ky. chairman; Howard T. Batman, Lynch Coal Operators' Reciprocal Assn.



MIIA ELECTIONS, 1956-57—Robert D. Bradford (left), assistant secretary, Okla.; Joseph Bierer, secretary, W. Va.; Frank T. Powers, treasurer, Md.; Arthur Bradbury, third vice president, Ky.; Harry J. Dusz, first vice president, Ohio; J. J. Forbes, president, Washington, D. C.; Clyde McDowell, secretary emeritus, J. H. Edwards, W. Va., and W. J. Schuster, Ohio, not present for the picture, were elected editor-in-chief and publicity editor, respectively. Mr. McDowell resigned after 30 yr as MIIA secretary. Several testimonials, standing applause and a watch (to be purchased) were given as recognition of the association's respect for his long, loyal, unstinted service.

to C. E. Linkous, director of safety, Island Creek Coal Co., depends on numerous factors. The most important of these are:

1. An approved plan or method of installing bolts.
2. Sincerity on the part of management to improve working conditions.
3. Proper drilling and tightening equipment.
4. Selling the men on the plan by explaining the WHY, WHEN and WHERE, and maintaining their confidence in it.
5. Absolute honesty, on the part of the immediate supervisor, in adhering to the approved plan of minimum roof support.

Experience has demonstrated that roof bolts can be used successfully to prevent fatal and disabling injuries under most roof conditions encountered in the states where Island Creek operates mines.

Mr. Linkous cited his company's safety record before and after roof-bolting was adopted in 1949.

"During 1948, the last year that we operated completely with conventional timbering, we had 41 lost-time injuries and four fatalities due to roof falls. From January, 1951, to December, 1955, we had a total of 33 lost-time injuries and three fatalities from roof falls. During this 5-yr period, one less fatality and eight fewer lost-time injuries occurred than during the 1 yr prior to adopting roof-bolting for roof control. During 1948, we produced 6,136,000 tons of coal, or 149,658 tons per roof-fall injury and 1,534,000 tons per fatality. During the period of 1951 to 1955, inclusive, our company produced 34,575,000 tons of coal, or 1,045,000 tons per roof-fall injury and 11,525,000 tons per roof-fall fatality. Furthermore, during 1955, our company produced more than 10,000,000 tons of coal while having one roof-fall fatality and this fatal injury occurred in an idle conventional timbered section which had been developed prior to the advent of roof-bolting."

In all commercial mines in West Virginia, Mr. Linkous noted that the average fatalities for the 7 yr prior to roof-bolting was 148 and tons per fatality 995,807. For the 7-yr period since roof-bolting was adopted by many of the mines in West Virginia, the average is 79 fatalities and 1,654,191 tons per roof-fall fatality. This is certainly an improvement and, if the previous average rate had continued, represents a saving of 483 lives from roof falls in our state during this 7-yr period. The above, in itself, is proof that roof-bolting is the positive approach to reducing, if not eventually eliminating entirely, injuries from falls of roof.

Mines that have not tried roof-bolting should check on the possibilities of adopting this method of roof support. Roof-bolting is an effective way to reduce both fatal and disabling injuries from falls of roof, and failure to take advantage of the opportunity it presents to reduce roof-fall injuries could be tragic. Furthermore, it affords an excellent opportunity to increase production and lower mining costs by reason of increased maneuverability, etc.

Roof-bolting has done a miraculous job to date but it is not the complete answer to securing a roof in any mine. There is still a prop pile on the surface at the mine and there always will be, stated Charles H. Curry, mine inspector, 14th Bituminous Dist., Pennsylvania Dept. of Mines.

The contribution of conventional timbering has been invaluable to the mining industry, and in first-mining places of minimum widths, timbering in the conventional manner must be relied upon or at least supplement other means. There are some types of mine roof that cannot be safely supported in any other manner except timbering; as, for example, where roof is non-laminated, too friable, too porous, or too soft to provide a secure anchoring point.

Temporary roof support of the conventional types must be provided in the working faces to provide the proper protection from falls of roof, even for those persons engaged in the work of securing roof by other means.

The best haulageway accident-free records appear to be accruing in those mines where legs are eliminated. This is accomplished through supporting the cross timbers or beams on steel stub pins or by hitching the ends of the timber well over the coal ribs. In this manner, the dislodgment of the legs by portable machinery is overcome.

Coal mines that have the best roof-fall accident record are the mines in which the reliance on personal judgment of the soundness of roof is eliminated as nearly as possible in the working face areas, regardless of its character, vibra-

tional reaction and/or its appearance. It follows that at every mine the roof condition should be studied thoroughly, and if the method of mining is proper and suitable, an adequate and systematic method of supporting roof should be adopted to achieve maximum safety under the conditions encountered. Additional roof supports should be provided and set as warranted if abnormal conditions are met. This action and procedure have proved invaluable in eliminating accidents, especially in the working face area.

In floor discussion, chairman Forbes asked Earl R. Maize, USBM, Pittsburgh, to comment on a plastic glue being developed for bonding layers of strata together in roof support. Mr. Maize said that the USBM had been working with one of the large chemical companies on the development of such a glue. The project is still in the laboratory stage. However, a permeable glue has been found which might be suitable. Pilot plant work should begin in a couple months and full-scale testing probably in a year.

From some of Mr. Sloman's remarks, Nathaniel Kirk, Snow Hill Coal Corp., said the group might think that foremen and other mine officials are only interested in telling their men to get the coal out and to forget safety. "In my 27 yr as a foreman around coal mines, I have yet to say that and I have never worked for a company which said that." Mr. Sloman replied he did not mean that foremen would deliberately take such an attitude. Sometimes a person gets mixed up and fails to include roof safety as a part of the production cycle. There is a tendency to put off doing what should be done and to try to outguess what the roof is going to do. Until the industry realizes that roof support is an integral part of the production cycle, avoidable accidents will continue.

In another comment, Arthur Bradbury, assistant manager, Inland Steel, Wheelwright, Ky., remarked that the most important thing was to get the story of safety and roof support to all men in the mine.

Safety must become part of production control, emphasized George Sambrook, director, mine inspection, U. S. Steel. "In too many cases, minimum standards have become maximum standards."

All should continue to follow the many problems involved in safety and roof support, stated Thomas Allen, chief inspector, coal mines, Colorado. There is no such thing as a room where the roof will hold up. The problem won't be solved today or tomorrow but it will eventually be solved.

Loren H. Newman, chief mine inspector, Montana, commented that roof control must be considered from the production standpoint. Control production and you control safety, he said.

One of the most important jobs to be done is to get the industry to put up enough roof support equipment, including props, roof-bolts, crossbars, etc., stated Henry Ciechomski, superintendent, Glen Castle Mine, Hanna Coal Co.

J. B. Yanity, USBM, remarked that 1954 was going to be the year and "we're still singing the same song." There is a great need for action. "We know what to do but must train the men to do it."

Management's most outstanding failure is to minimize the importance of supervisors' and workmen's attitudes toward safety, stressed C. G. Evans, The North American Coal Corp., in the next paper.

The four facets to a human being that contribute most to make proper attitudes possible are mental capacity, aptitude, experience and personality, Mr. Evans said. Each of these facets should be analyzed more completely in hiring personnel if management is going to achieve the harmonious team spirit compatible with the highest degree of safety. Otherwise, it will be a case of "we hire in a hurry and regret in leisure."

Mr. Evans pointed out that 82% of the supervisory discharges in all industries in the United States in 1954 resulted from disputes or disagreements between the supervisor and his associates, assistants or bosses. Mr Evans pinned on management the responsibility to pick the proper people, train them in the best methods available, and create for them a place of business which will permit proper attitudes to grow.

Discussing Mr. Evans' paper, Charles K. Parker, safety inspector, Eastern Gas & Fuel Associates, said the records indicate that too many supervisors and workmen do not have a firm attitude toward reducing roof-fall accidents. "We are confronted with the problem of trying to get them in the right mood or a particular state of mind that will accomplish results in the reduction of these accidents."

Safety used to be the first consideration in the major portion of our coal mines. But Mr. Parker said he believed that "old man production" has edged into first consideration in the minds of too many of our supervisors and workmen in this mechanical mining age. "In other words, we have too many mines that are 100% for safety but, brother, don't stop the hoist."

There is not enough sincere training being done today to properly educate the supervisors and workmen, and to keep them safety conscious or to get them to do what they know they should do safety-wise.

Mr. Parker stressed the need for going back to some of the fundamental training on roof support with strict adherence to timbering standards and rules, with safety the first consideration in our coal mines. Some of the fundamentals of roof support that are not receiving proper attention are roof examination and testing, width of places, placing of drill holes for blasting and the use of safety posts and safety jacks.

Accident prevention and first-aid training by the USBM should be compulsory for all supervisors and workmen in and about coal mines. One course each year is desirable to help keep the organization safety conscious.

"I think the solution to reducing roof-fall accidents is to find the key to awakening both management and labor to their respective responsibilities."

While safety is primarily the responsibility of management, Mr. Parker urged that a plan be worked out with union officials whereby supervisors and workmen would be penalized for violating timbering standards. The penalty suggested was a 10-day suspension from work. A penalty of this sort, would bring an immediate drop in roof-fall accidents, Mr. Parker believes.

(Ed. note: Members, guests and ladies spent Tuesday visiting Lockbourne Air Base and the Bituminous Coal Research laboratory. James D. Reilly, Hanna Coal Co., acted as toastmaster at the annual banquet-dance held in the Deshler Hilton Ballroom during the evening.)

Mine Lighting

In attacking the problem of how to improve mine lighting, theoretical considerations had a definite and essential role, stated E. J. Gleim, USBM, presenting the first paper at the Wednesday morning meeting under the chairmanship of Harry J. Dusz, Div. of Mines, Columbus, Ohio. But, added Mr. Gleim, an actual installation in a commercial mine was needed in assessing the practical value of proposed systems.

Experimental installations in Pennsylvania and West Virginia mines ultimately reached the point where trials, however desirable, could not be made in gassy mines because no permissible lighting systems were available. Moreover, the USBM had no schedule under which such systems could be approved. Accordingly, the Bureau was urged to prepare such standards. The Branch of Electrical-Mechanical Testing (of which Mr. Gleim is chief) was assigned the task of preparing such a code, and the first draft was completed in July, 1955. After careful consideration had been given comments and suggestions for changes received from representatives of manufacturers, mine operators, and mine workers, a revised draft was approved and became effective Jan. 10, 1956, upon publication in the Federal Register of that date. This set of requirements is designated Schedule 29.

Briefly, this schedule prescribes conditions for approval of complete lighting systems connected to regular or special circuits in the mine, as differing from self-contained (battery-operated) portable lamps. It also provides for approval of special lighting systems, such as for underground photography. Considerations for approval are based mainly upon the protection afforded against fire and explosion hazards.

When this paper was written, Mr. Gleim said, no lighting system had been fully investigated for approval, although several manufacturers are engaged in developing components. When approved systems become available, the Bureau believes that an important contribution will have been made to safety and efficiency of mine operations, even if the illumination is not as effective as that provided in other industries.

The design of an approved mine lighting system, one that will be effective, one that will be practical for use under-

ground, is one of the most difficult tasks ever given to a design engineer, declared S. P. Carter, superintendent of maintenance, Armco Steel Corp. The restrictions placed on a lighting system for face illumination of a coal mine are tremendous. A safe, practical, mine lighting system is needed, yet the requirements are so severe that the design of such a lighting system is an almost impossible task. Good practical mine lighting is not compatible with mine conditions, methods and restrictions. This is the problem in mine illumination.

The board of directors of Bituminous Coal Research, Inc., recognizing the need for better illumination in the active working area of coal mines, authorized a mine illumination project by the Development Committee of this organization in 1953. This project had as its objective the determination of the feasibility and practicability of lighting the active working area of a coal mine. This was the beginning of what has become known as "area lighting in coal mines."

The development, experimentation, and the first installation of an area lighting system under this project was at the Owings (W. Va.) mine, Consolidation Coal Co. (W. Va.). Here it was proved that the active working area of a coal mine could be successfully illuminated. The second phase of this project was to evaluate the lighting system developed at Owings to determine the advantages, disadvantages, and the problems encountered in the operation of this type of lighting system.

The lighting equipment was moved from Owings to the Dorothy mine of Armco Steel Corp., Montcoal, W. Va., in May, 1954. The system has been in continuous operation on the same section of the Dorothy mine since May, 1954, a period of approximately 24 mo. There has been no attempt made to alter or improve the equipment.

The mine lighting system has only three separate components: namely, the light fixture, the power cable, and the power conversion unit.

The maximum number of lights in use at one time is 140. The maximum floor area illuminated in the setup is 37,784 sq ft. There is an average of 252 sq ft of floor area to be illuminated per lamp. The minimum number of lights in use is 62 and this will occur when the motor-generator set is moved forward for a new setup. The motor-generator and the mine-car loading station are advanced in steps of 300 ft. The 15-ft spacing of the fixtures gives an average light distribution of from 1 to 2 ft-candles along the left-hand rib and in the active working area of the faces. It is believed that this is a minimum acceptable value for area mine lighting, and that additional light is needed in the active working faces.

The major accident record of the production sections of the Dorothy mine from May, 1954, when the lights were installed, to the present time, a period of approximately 24 mo, shows that three sections have each had one accident, one section has had two accidents, and one section has had five accidents. Section "D," the lighted section, has not had an accident during this period.

The lighted section produced more tons of clean coal per man-shift in 1955 than any of the other sections and this section also handled the largest tonnage of impurities. The total tonnage handled per man-shift by the lighted section was 17% above that of the next higher production section.

The area lighting system has been found a definite aid to the foreman in that it gives him a wider over-all vision of the different operations that are going on in each face of the section. The lights are particularly helpful to the loader operator and the shuttle-car operator. Better housekeeping is another definite advantage.

Supplies are more easily kept in order and fewer supplies are lost because anything on the mine floor is immediately visible to everyone. There is less fatigue of the workmen because of a decrease in the useless motions that he formerly went through due to not being able to see his entire surroundings. The morale of the entire working force on this section is increased, due to improved working conditions.

The cost of the equipment used in this experimental installation is not known, due to the fact that part of the equipment used was furnished by manufacturers at no cost to the project. It is estimated that the equipment would cost about $8,000 to $10,000. The probable cost of an approved mine lighting system for a section at this time would be only a guess since there is no approved system on the market at this time.

It is estimated that the power cost for operation of a section lighting system of the approximate size of the experimental installation would be approximately $40 a month for two-shift operation.

This mine lighting system is an experimental installation and, as such, is not permissible for use in coal mines. The experimental installation of this equipment in an active mining operation was made possible through the cooperation of the personnel of both the W. Va. Department of Mines and the USBM.

"Adequate mine lighting will not solve all of our safety problems because we have many accidents in which lighting is not a factor. Nor will it solve all our production problems. We believe it to be a desirable working tool, a help in the prevention of accidents, an aid to increased production, and an improvement in working conditions."

In planning any underground illumination system, whether for haulage roads or producing sections, Robert R. Godard, electrical engineer, Frick District, U. S. Steel Corp., said that consideration must be given to the following:

1. Level of illumination or intensity.
2. Uniformity or distribution of light.
3. Absence of glare.
4. Initial cost.
5. Maintenance cost.

The weight attached to each of these factors must be determined by the application. Speaking of intensity, for example, main haulage lighting requires a relatively low level of illumination, possibly ½ ft-candle, of extreme uniformity and complete absence of glare. If these conditions are not met, locomotive motormen will be blinded by glare or erratic distribution of light and a safety hazard will be created.

Lighting requirements for working sections, on the other hand, are varied. A comparatively high level of glareless illumination, 5 to 20 ft-candles, is desirable for face lighting, loading stations or other areas of high activity. Shuttle car haulage roads benefit from 2 to 4 average ft-candles of illumination. One to two foot-candles of uniform light will usually suffice for belt-conveyor systems, except at transfer points where 3 to 5 ft-candles are needed.

The levels of illumination just mentioned are seemingly far below today's industrial standards for lighting. However, it must be remembered that the intensity of illumination required for man to perform any task with ease is largely dependent upon the complexity of that task itself. There is no doubt that as mining machines become more efficient and probably more complicated, the light intensities needed will increase and may more closely approach industrial standards. (For additional details of Mr. Godard's description of haulage and section lighting experience at Frick District mines, see *Coal Age*, February, 1956, p 84.)

Underground illumination has not kept pace with the advancements in the design of modern mining equipment and improved techniques of the industry, stated J. A. Boyle, chief mine inspector, Frick District, U. S. Steel Corp. Recognizing this fact, U. S. Steel's Coal Div. has set out to see what can be done to remedy this situation. The corporation prevailed upon the USBM to formulate a schedule of permissibility for face-lighting equipment, giving manufacturers the opportunity to develop a method of illuminating face areas with fluorescent lights. An expanded program of research work aimed at better haulage lighting has been started.

Pursuing this course to its ultimate conclusion will result in giving coal miners the advantage of the best possible illumination underground, which in turn should give us equal opportunity to become competitive accident-wise with the best of other industries. The basis for this statement is the fact that the corporation's accident experience in the working spaces underground, where it is possible to provide adequate illumination, compares favorably with that of outside shops. An example is the motor barn in Robena mine where all the maintenance work on the locomotives accommodating a 24,000-ton operation is done. No lost-time accidents have been experienced in this motor barn during the past 10 yr. (For additional details of Mr. Boyle's discussion of safety and operating advantages in improved underground illumination, see *Coal Age*, February, 1956, p 87.)

Ventilation and Dust Control With Continuous Miners

"It is my company's aim to do the best possible job to properly control all the dust hazards connected with coal production." Thus the Alabama Power Co.'s manager of coal mines, James A. Hagy, characterized that company's intensified program for improving mine ventilation and wiping out the respiratory diseases to which miners are exposed.

Mr. Hagy described ventilation and dust control techniques employed at Gorgas, Ala., mines under continuous mining conditions. He said what the industry needs most to control dust are direct reading instruments for evaluating health hazards (not explosive hazards) from inhaled dust in coal mines. (Mr. Hagy's complete paper may be found in this issue of *Coal Age*, p 56.)

In discussion, Domenic Stanchina, deputy mine inspector, St. Clairsville, Ohio, commented on some interesting experimental studies done early this year in his inspection district on dust control by the management of the Saginaw Dock & Terminal Co., who operates a mine in the Pittsburgh seam. The entire output of this mine, Mr. Stanchina said, is produced with six continuous miners operating on a three-shift basis.

The coal in this mine is approximately 60 in thick and is overlaid with 12 in of drawslate. Three to four inches of coal is left under the drawslate to hold it in place until timbers are set. The timbers are set as soon as a working face is advanced enough to allow a timber to be put up.

Rooms are driven 300 ft deep. The coal is taken away from the continuous miner by shuttle cars. On two sections, however, the rooms are 600 ft deep, and the coal is moved from the continuous miner with an extensible belt.

An exhaust fan, with flexible tubing, was set up in a worked-out room next to a room where a continuous miner was working for the purpose of picking up dust that was not allayed by the miner's five water sprays, which operate under 400 lb of water pressure.

The tubing from the exhaust fan was run through a crosscut and along the right rib of the room where the miner was operating. The intake end of this tubing was placed 4 ft ahead of the machine operator.

A volume of 7,900 cu ft of air was conducted into the working room and from this volume 4,200 cu ft passed across the working face of the room and flowed into the intake end of the exhaust fan tubing. The air and dust flowing through the tubing was discharged through the fan directly into two water sprays.

With the exhaust fan operating there was a noticeable increase in the visibility the machine operator and timberman had of the face and of the roof area that was being worked. A difference in the temperature of the working area was also noted, although temperature readings were not taken at the time.

An analysis of an air sample taken at the face of the room when the exhaust fan was running showed the following content: carbon dioxide, 0.10%; methane, 0.12%. When the exhaust fan was stopped for 15 min, analysis of an air sample showed 0.14% carbon dioxide and 0.21% methane.

In a dust sample taken when the exhaust fan was running, there were 10.8 million particles per cu ft. With the exhaust fan stopped, there were 14.4 million particles per cu ft.

The results gained by having an exhaust fan operating were worth while. It allows tubing to be used instead of a line brattice which, of course, is hard to construct because of the uneven roof cut by the miner, which, in turn, becomes ineffective if the line brattrice is run any distance. In addition to clearing the working face, the ease of handling and extending tubing is desirable in a low-head-room area.

Because the air was discharged through the fan at high velocity, some of the dust was carried through the two water sprays which were set up near the fan. In a future experiment an attempt will be made to discharge the volume of air through a set of baffle plates and thus reduce the velocity and allow the water to have more effect on the dust as it goes through.

Adding further discussion, James H. Phalan, chief, Kentucky Dept. of Mines and Minerals, suggested that more study should be devoted to effective application of water as a suppressive measure, and to improved methods of ventilation in continuous mining operations.

"It appears that safety has failed to keep pace with the design of new equipment. Even though much sas been done toward solving these problems, the surface has only been scratched. In order to solve the problems, all concerned must be ventilation and dust conscious, from top management through the safety departments and down through the ranks.

"Good dust and ventilation control in continuous mining operations, besides being desirable from the health and safety standpoint, is a decided aid to production."

From the floor, Arthur Bradford asked Mr. Hagy for more information on the direct reading instrument for evaluating health hazards from inhaled dust in coal mines. Mr. Hagy said that the instrument would probably be available for test applications at Alabama Power mines in about 2 mo. The instrument is now used for military purposes and no details on its mechanism can be disclosed.

Coal Mine of the Future

"How will the coal industry produce the well-accepted 800-million tons per year requirement projected for the United States in 1975?" This is really the question that must be answered in predicting the coal mine of the future. Thus J. W. Woomer, consulting mining engineer, J. W. Woomer & Associates, started off the Wednesday afternoon proceedings following his introduction by chairman A. D. Sisk.

To get the projected 800-million tonnage by 1975, Mr. Woomer said we must recognize that present mines will have to be replaced and new ones added at a cost (in terms of today's costs) of nearly $8 billion.

Furthermore, production per man will have to increase 100% to 16.5 tons per man-day or 4,000 tons per man-year if the selling price of coal is to be held down to $4.90 per ton f.o.b. mines and if pay for the more highly skilled labor force needed rises to an average of $30 per day.

A total of 16.5 tons per man-day will demand that the face production men produce 66 tons each and that the future ratio of backup men to face men be 3 to 1.

A partial list of what we must have at the face follows:

1. Good continuous mining devices.
2. Continuous mining devices for thin seams.
3. Complete flexibility and mobility for all face equipment.
4. Complete use of alternating current as compared to the present direct current use.
5. Built-in transformers on face equipment.
6. Partial guidance of face equipment by electronics, but no automation as such.
7. Built-in timbering or roof-bolting equipment.
8. Face service by conveyors.
9. Automatic lubrication.
10. Automatic methane and dust detection and alarms and recorders.

Moreover, facilities for "backup" jobs must also be upgraded. Supervision, engineering and office work, for example must be further mechanized. The general outside work must be reduced by more materials-handling equipment. Preparation plants must be supplied with television devices, electronic controls, automatic dust controls, automatic barge and car handling equipment and automatic refuse-disposal devices. Maintenance must be based on thoroughly trained personnel, preventive and unitized maintenance policies, spare equipment or spare operating sections, electronic devices and television to view critical operations, and automatic lubrication devices. Haulage demands will require a complete review of the advantages of conveyors over car haulage and the resultant obviously better opportunity for full use of alternating current and fully automatic controls. The general inside force, whose job includes retimbering, recovering of materials, erection of brattices and other work, must have all of the mechanized tools and mobile equipment available.

In the field of everyday safety the mines must have fully automatic recording systems, water and rock dust in pipes, television inspection, electronic illumination, and multiple and modern communications at all points. Noteworthy in this field of safety is the requirement for fewer face and haulage men. These occupations are the well-known fertile fields for accidents in coal-mining.

All of the above findings on future labor dispersal permits the making of

the following interesting comparative tabulation:

Classification	Men Required Present	Future
Supervision, engineering and office	20,000	22,700
General outside labor	6,000	6,500
Preparation	12,000	14,000
Machinery maintenance	26,000	49,000
Haulage	11,000	10,000
General inside labor	38,000	41,600
Production men	100,000	38,200
Total	213,000	213,000

Noteworthy in the above is the portrayal of the tremendous training job required when it is realized that the maintenance force must be increased 88% as part of the total job of upgrading all labor categories to meet the problem.

In floor discussion, Arthur Bradbury asked Mr. Woomer how the big increase projected for maintenance men was going to be achieved. Mr. Woomer replied that his paper was not intended to give answers to all questions raised. Instead it was intended to be provocative and stimulating, and to acquaint the industry and the public with the job ahead. Coal will have to compete with other industries in the capital and labor markets. He added that scholarships, though essential to attracting personnel, are being overdone. It is more important to give incentives to high school students.

Commenting on the personnel problem, Mr. Sisk said that he had noted a serious lack of cooperation in Kentucky between the coal industry and schools and colleges. Schools cannot get students interested because there is still a stigma of dirtiness and danger attached to coal mining which should be removed. Education and cooperation is the answer to many of our problems.

T. J. Liddle, safety inspector, Stonega Coke & Coal Co., took the floor to add that he had noted that children were not allowed at the Bluefield Show last month. He said he thought it was a mistake not to take the young fellows along to see the equipment. The coal industry, Mr. Liddle added, should make a point of providing schools with mining equipment to arouse the curiosity and interest of youths.

W. J. Schuster, safety director, Hanna Coal Co., said he agreed with Mr. Woomer that scholarships are not the answer. The high schools are "where we must go to bat." Teachers must be guided by the industry and helped with instruction aids. He added that schools should concentrate on general matters concerning the coal industry, leaving mechanical operation and production techniques for training at the mines.

If the industry is short of necessary engineers, commented J. B. Benson, safety director, Southern Coal Producers' Association, it's because proper pay and professional status are not being offered to new recruits.

Wet Rock Dusting

The effectiveness of wet rock dusting close to advancing active faces was described by Irving Hartmann in a paper co-authored with J. K. Rauschenberger. In coal dust explosion tests at USBM's experimental coal mine, the two USBM explosives technologists have found that:

1. Dry limestone dust distributed by machine was more effective than wetted rock dust in arresting the propagation of explosions.

2. Wetted limestone dust was more effective after complete drying than after partial drying.

3. The effectiveness of wetted limestone dusts decreased slightly with increased caking tendency.

4. Dry rock dust distributed on the floor in entries where wet rock dust had been applied on the rib and roof surfaces helped to limit flame propagation.

5. When rock dusting was carried to within 50 ft of the coal face (owing to the physical layout of the experimental coal mine, this limiting distance was 50 ft rather than 40 ft), explosions initiated by all sources of ignition were arrested readily (with the exception cited in Par. 7 below), either with wetted rock dust on ribs and roof plus dry rock dust on the floor, or with dry rock dust distributed by machine.

6. When rock dusting was carried only to within 100 ft of the face, difficulty was encountered in stopping some explosions. When the rock dusting started 150 or 200 ft from the face, it was most difficult, if not impossible, to stop the explosions.

7. In a few tests the explosions could not be arrested within the rock-dusted zone, even when the rock dusting was begun 50 ft from the coal face. This occurred in one test when pulverized coal dust was distributed at the rate of 1 lb per linear foot on the rock-dusted surfaces (1 lb of coal dust per linear foot of entry, evenly distributed on the rib, roof and floor, forms a layer slightly more than 1/100th in thick). This calls attention to the need for periodic re-rock-dusting of mine surfaces to neutralize the dangerous freshly deposited layer of (float) coal dust on the rock dust.

Recently interest has been expressed in the substitution of wet rock dusting for conventional dry rock dusting in various parts of mines. Before wet rock dusting is introduced throughout a mine, however, the questions below should be carefully considered. The answers to all will not be known until further research has been done and additional experience is at hand.

1. Wet rock dusting has been found effective in stopping explosions near their point of origin. Would the application be equally effective at greater distances from the source against more fully developed explosions?

2. More rock dust is required per unit length of entry when the ribs and roof are wet-rock-dusted and dry rock dust is applied on the floor than in conventional dry rock dusting. Would the substitution of wet rock dusting, therefore, be economically sound?

3. Wetted rock dust adheres better than dry rock dust to freshly exposed ribs and roof, and an area properly treated with wet rock dust has a good appearance. How well will the wetted rock dust adhere to the surfaces and how dispersible will it be after exposure in the mine for several years, during which it is subjected to numerous changes in humidity and temperature? Dry rock dust, by the way, adheres better to previously rock-dusted (slightly moistened) surfaces than to freshly exposed ribs and roof.

4. The potential explosion hazard of float (coal) dust is greater on wet-rock-dusted surfaces than on dry rock dust. The question arises whether, in areas remote from active faces, enough care would be exercised to observe promptly the spalling of surfaces and deposition of float dust to the extent when re-rock-dusting is needed.

5. In mine areas where normally very high humidities prevail the wetted rock dust may not dry adequately for a long time, and thus its effectiveness might remain very low. It might be advisable to avoid application of wetted rock dust in such places.

6. Before general use of wetted rock dust is advocated or encouraged, the possible limitations of highly caking rock dusts should be explored. This might require study of the effects of fineness, particle shape, composition, and other properties on caking tendency.

7. Limited experiments indicate that effective wet rock dusting may be most difficult to achieve on mine surfaces that contain appreciable coal dust. Such conditions are likely to prevail in old workings where the ribs have sloughed considerably and where float dust has been deposited for a long time.

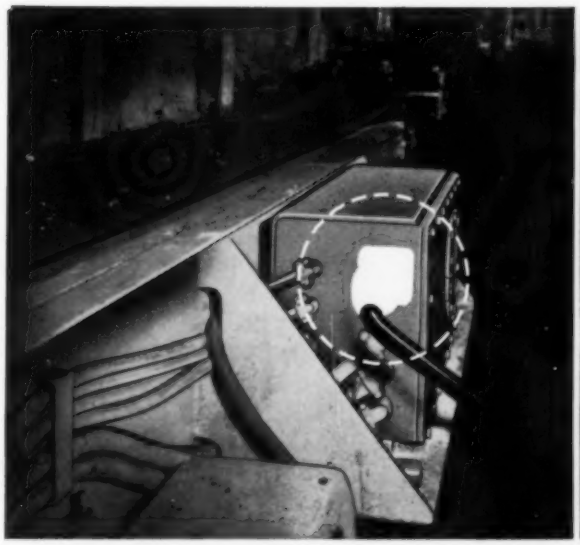
The application of wet rock dust at the United States Steel Corp.'s No. 32 mine, Lynch, Ky., and Robena No. 1 mine, Greensboro, Pa., has passed the experimental state and is now being done as a part of the regular work cycle at the face area, stated Wayne D. Snell, assistant director, mine inspection. (Methods of application and equipment used at U. S. Steel's No. 32 mine, Lynch, Ky., and at Leisenring No. 3 are described by Mr. Snell in *Coal Age*, January, 1956, p 62.)

Mr. Snell presented data and showed slides on the application of wet and dry rock dusting at Lynch No. 32 and Robena No. 1. Wet rock dust has been applied to about 20,000 lin ft of mine surface at the Robena. The mines of the U. S. Steel Corp. are making plans, he added, to expand the use of wet rock dusting to include all sections of the mines where there is a continuous section.

In floor discussion, Charles Farkes queried Mr. Snell: After wet rock dust has set for a week or month on a rib or after it has dried out completely, can you brush a sample off the rib like you would dry dust? Mr. Snell explained that drying out wet rock dusting depends on the humidity in the air. When wet rock dusting reaches a certain point after three or four days, it can be brushed off, but before that time a scraper must be used to obtain a sample.

Mr. Farkes then asked what the best procedure is in the face area when there is a dry bottom and rock dust is applied wet. Mr. Snell replied that no one takes a sack of dry rock dust and empties it on the floor. "We use a drag on our shuttle cars and it does a very good job of distributing the rock dust on the mine floor."

(Continued on p 168)





What Electrical Connectors would you choose ...for these installations?

Modern mining techniques allow little time for coddling men or equipment . . . so it's a safe bet your answer to the question in our headline will be based on more than just the electrical requirements of the equipment. Such important considerations as safety, efficiency, durability and maintenance cost, will influence your selection. *This is as it should be and we're glad it's true* . . . for the mining industry's constant search for the best available equipment has made JOY Electrical Connectors their preferred choice since 1928.

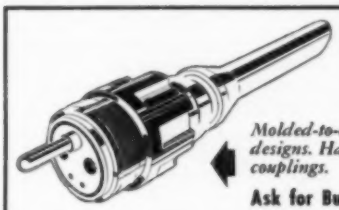
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JOY plugs and receptacles are specifically designed to provide long-range, maintenance-free service under the most adverse operating conditions . . . and they're available in styles and sizes to meet every mining need. Two of the currently *most popular* designs for mining installations are illustrated at right. Equipped with non-corrosive metal couplings and flame-resistant Neoprene bodies, both are moisture-tight, shatter-proof and distortion-resistant.

Straight Pin Bigun (SPB)—Have threaded metal couplings. Plugs are factory-vulcanized to 36" cable leads or to lengths as specified. See Bulletin B39a for complete information.

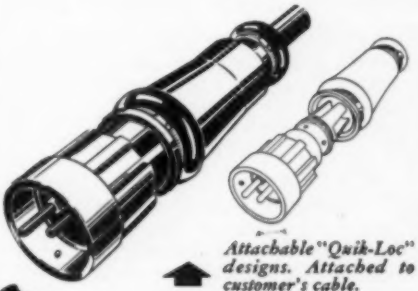
Attachable "Quik-Loc" styles—Attach quickly to customer's own cable. Newly designed couplings completely engage or disengage in ¾ turn. See Bulletin B57 for complete details.

JOY plugs and receptacles are available for both AC and DC applications. In addition, "SPB" and "Quik-Loc" connectors may be supplied with pilot control contacts for *permissible operation* when used in conjunction with JOY'S Bureau of Mines-Approved distribution centers (SCC units). Ask us for complete information, ***Joy Manufacturing Company, Henry W. Oliver Building, Pittsburgh (22) Pa.*** In Canada: *Joy Manufacturing Co. (Canada) Limited, Galt, Ont.*



Molded-to-cable "SPB" designs. Have threaded couplings.

Ask for Bulletin B39a.



Attachable "Quik-Loc" designs. Attached to customer's cable.

Ask for Bulletin B57.

WBD CD8447

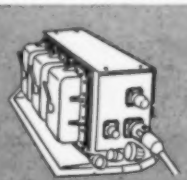


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Safety Circuit Centers



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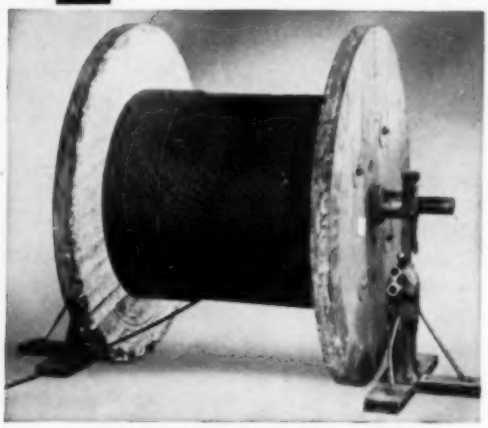
New Cable Vulcanizer

Tuffy® Tips



Store Rope Like This

Keep spare rope in a dry, sheltered place free of dust, vapors or fume-laden air. If stored out of doors, set reel on blocks off the ground. Clear away weeds and grass and protect with a waterproof covering as shown. Check each month for rust caused by moisture collecting on the rope. Paint with a heavy crankcase or cylinder oil if rust is discovered or even before it shows up if moisture is present.



Unwind. Like This

When getting ready to install the rope, special care should be taken to see that the reel is set up for smooth, easy unreeling. Set reel up on jacks as shown above and unreel so the rope pulls off from the bottom of the reel—*not* from the top. Coils should be put on a swift or rolled on the ground to pay off the rope. Kinks or "doglegs" may result from incorrect unreeling, seriously damaging wires of the rope and greatly reducing the ultimate life.

Research Adds Factual Data On Sheave Sizes

Until recently determination of sheave sizes has been by rule of thumb, experience and meager factual data. The influence of variables in operating conditions on rope life must still be determined by experience.

Insofar as bending stresses alone would be the primary cause of rope failure, exhaustive bending tests have established factual data giving a better guide than the former fixed sheave diameter and construction ratio tables.

These tests were conducted under the auspices of the Wire Rope Technical Board and the American Petroleum Institute.

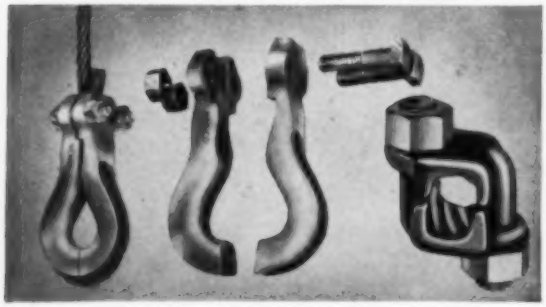
From the experimental data this developed, the following table on sheave diameter factors is introduced as a preliminary guide in selecting the proper sheave size. It lists the general purpose range on the more commonly used rope constructions based primarily upon bending stresses. If it becomes expedient to go either above or below the general range, plotted curves will be supplied by Union Wire Rope engineers for determining the change in service life due to bending fatigue.



SHEAVE DIAMETER FACTORS

Rope Construction	Higher Range	General Purpose Range D/d Ratios		Lower Range
6x7	For example: Shaft hoists would require higher values	63	42	For example: Truck winch would require lower values
18x7		54	36	
6x17 Seale		49	33	
6x19 Seale		45	30	
6x21 Filler Wire		39	26	
6x25 Filler Wire		36	24	
6x31		33	22	
8x19 Seale		31	21	
6x37		27	18	
8x19 Warrington		27	18	
Tiller Rope		18	12	

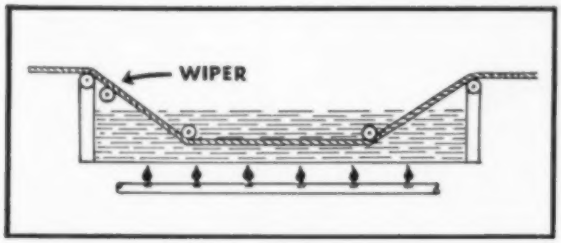
To determine sheave diameter multiply higher or lower range values above by the rope diameter.

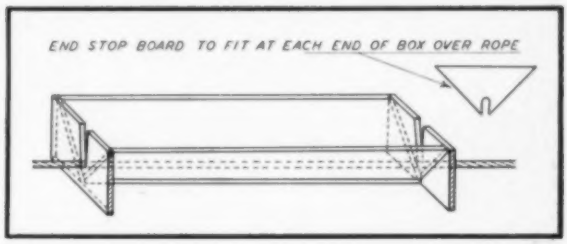


Attach By Clipping

The fittings you use on wire rope can handicap it or enable it to work at full efficiency. Fittings which derive holding power by crimping action are harmful to the rope. Shown here are two rope clamps. One is a combination clamp and thimble. Both provide snug saddling of the rope and grip larger and uncrimped bearing surfaces so tightly that the loads are carried almost solely by the force of friction.

To More Than Break Even In Service Life Give Your WIRE ROPE An Even Break

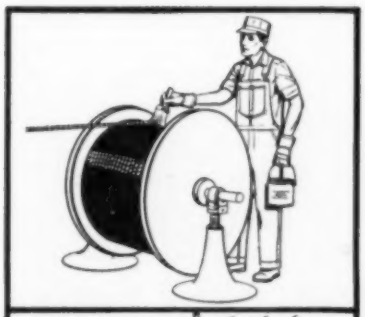


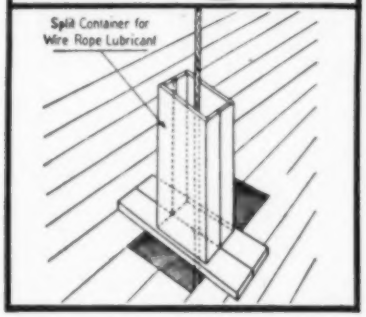


Rope That Is Stored for long periods of time should be lubricated during installation. If it is not possible to lubricate stored rope very often, apply a sealing compound to hold the lubricant that is already present.

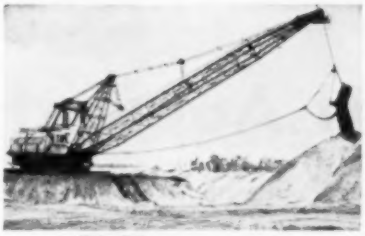
Rope In Use can be lubricated most economically without removing it from the equipment on which it is operated. Lubricate rope as often as it needs it—service conditions determine the frequency.

Use Lubricant Hot or Cold, depending on its penetrating qualities. Your local oil company engineer will be able to recommend an oil that will actually penetrate to the working parts of the rope, and not just form a coating that peels off the first time your rope runs through a sheave.





Specifications? – say Tuffy







Tuffy Dragline

Has an inside flexibility for easier casting and better spooling and enlarged outside wearing surface to take more abrasive wear.



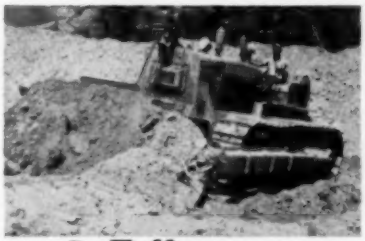
Tuffy Scraper Rope

Small winch drums, heavy line pull, rapid running lines and slack take-up shock call for this special rope to cut down-time and curb rope waste.



Tuffy Slings

A 9-part machine braided wire fabric construction which defies distortion damage and breakages. With Tuffy Hoist Lines, they give you a stay-with-it team of balanced performers.





Tuffy Slusher Rope

A special 3 strand, non-collapsing rope to over-match the four rope killing conditions imposed by slusher loading operations. Easily knotted or eye-spliced for continued service.



Tuffy Dozer Rope

Tailored to retard the severe destructive forces imposed by small winch drums and tough terrain. 1/2" and 9/16" on 150 ft. reels.

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EMPLOYEE TESTING, COST BUDGETS AND PROCURING TECHNICALLY TRAINED PERSONNEL—Seated: T. A. Miller, New Jersey Zinc Co.; Lew Helmick, L. F. Zager, Helmick and Associates; W. F. Diamond, Island Creek Coal Co.; Standing: J. B. Herring, C. & O. Ry., session chairman; G. R. Spindler, Virginia University; Paul Winter, Logan County Schools; and Lamar Weaver, Tennessee Copper Co.

Central Appalachian Section

Cost budgets, personnel problems, safety, and preparation are major topics at two-day meeting.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

TESTING as an aid to employee selection, application of variable cost budgets to the mining industry, securing technically trained personnel for the mineral industries, safety in the future, pillar mining, ground fault protection, and dry cleaning fine coal were major topics at the spring meeting of the Central Appalachian Section, AIME, at Abingdon, Va., May 18 and 19. R. M. Allen, president, Central Appalachian Section, AIME, presided at the Friday luncheon and dinner. J. Martin Orndorff, Roanoke *Times*, was speaker at the luncheon. Robert Porterfield, director, Virginia State (Barter) theater, spoke at the dinner, and Fred K. Prosser, coal traffic manager, N & W R. R., was toastmaster.

Speakers and their subjects at the morning session were: T. G. Miller, chief of personnel, New Jersey Zinc Co., Austinville, Va., on testing as an aid in employee selection; L. F. Zager and Lew Helmick, Helmick & Associates, Cleveland, Ohio, on development and application of variable cost budgets to the mining industry. The remainder of the session



WASTE ABATEMENT, SAFETY AND PILLAR MINING—R. A. Cassell (left), Pocahontas Fuel Co.; L. E. Gillenwater, West Virginia State Water Commission; A. E. Sadler, and W. J. Skewes, Pocahontas Fuel Co.



GROUND-FAULT PROTECTION, FINE-COAL CLEANING—B. H. Van Vactor (left), National Mine Service Co.; Frank Morris, Clinchfield Coal Corp., session chairman; R. D. Wesner, Boone County Coal Corp.

Views Coal Problems

was devoted to a symposium problem on procuring technically trained personnel for the mineral industries. Participating in the discussion were William Diamond, assistant to the vice president, engineering, Island Creek Coal Co., Holden, W. Va.; Lamar Weaver, general superintendent, Tennessee Copper Co., Copperhill, Tenn.; G. R. Spindler, director, School of Mines, West Virginia University, Morgantown, W. Va.; and Paul Winter, superintendent, Logan County Schools, Logan, W. Va. J. B. Herring, C & O R. R., was session chairman.

TESTING TO SELECT EMPLOYEES

Management must realize that it is men and how management uses them that decides the difference between profit and loss, Mr. Miller declared, in opening his discussion of employee testing. Before men can be trained, a proper selection must be made. Proper selection is the keynote as to whether there will be profit or loss in the future.

Employee tests are as useful to an employer as diamond drilling is to a geologist. When an applicant walks into an office, the employer has only the "surface" to look at. As a result of non-verbal tests, Mr. Miller said his company found that those falling in the 0 to 11 percentile usually are not too good and selection should be made from those in the 11 to 60 percentile group. Those below the 11 percentile need excessive supervision and present problems once they are hired. Those above 65-percentile group are quick to learn but once they are in a group they often are looked on as "smart alecks" and the foreman says they don't fit. This is because the man is working at a job below his capacity, Mr. Miller said. The best foremen were found to be at the top in mental alertness and judgment tests.

Tests are useful in trying to fit applicants to a particular job, selecting men for promotion, reducing training costs and getting square pegs in square holes. However, tests are only a partial solution and must be considered as a tool. If they are used they can result in better employee relations and more profit for the company, Mr. Miller concluded.

APPLYING COST BUDGETS

Direct labor accounts for ⅔ of controllable cost but the question of what can be done about the other ⅓'s arises, Mr. Helmick said. In tackling cost problems, actual costs are analyzed and then ways are developed to reduce them. Since most of the items can be controlled by supervisors, an incentive system was put into effect. Incentives should be paid on a team basis rather than to individuals. To be successful, the program must be sold to management, Mr. Helmick declared.

The first step in cost work is to analyze the accounts in use and expenses charged to each. Then the responsibility for each can be established. In some cases it is necessary to change the card of accounts. An important point is that a man cannot be held responsible for some item he is not responsible for and has no authority over, Mr. Zager explained.

The second step is to develop a budget for the company. Motion and time analysis is the third step. The requirements for each operation, each section and the total for the mine should be determined, Mr. Zager added.

By applying team incentives at one company, costs were reduced 18% with a bonus of 12% to the supervisors. If the coal miner is given the right tools and right training he is one of the best.

The survival of the coal industry depends on its ability to adapt itself to changing conditions. There is a great future for the industry if new techniques are applied, Mr. Zager concluded.

PERSONNEL SYMPOSIUM

Lead-off speaker at the symposium on problems of procuring technically trained personnel for the mineral industries was William Diamond, who discussed the problem from the viewpoint of the coal industry. Many young men look with disfavor on coal mining as a career because of the fluctuating conditions of the industry, unfavorable living conditions and lack of employee benefits. To correct these conditions the following can be done: (1) establish a good public relations program; (2) get the full story to the parents; (3) expand scholarships; (4) examine employee benefits and improve them where necessary; (5) provide summer employment for undergraduate engineers; and (6) carry on more work with students at the high school and pre-high school levels.

In discussing what Island Creek Coal Co. does to secure personnel, Mr. Diamond said the following program is carried out: (1) three men are sent to mining engineering schools to interview graduate and undergraduate engineers; (2) continual contact is maintained with schools and employment agencies; (3) the company participates in school programs; (4) housing is being improved; (5) a sickness and accident program is in effect; (6) a retirement plan has been established; (7) employees receive a two-week vacation; and (8) the company participates in local high-school programs.

The problem of securing technically trained men is industry wide and it must be tackled by all coal mining companies, Mr. Diamond declared.

There never has been a shortage of engineers in his company, Mr. Weaver said in discussing the problems from the non-fuels viewpoint. Engineers are given an opportunity to grow in the company. A five-point program at the Tennessee Copper Co. includes (1) encouraging students to visit plants; (2) instilling in students the opportunities in the industry; (3) awarding prizes for essays; (4) supporting the AIME; and (5) permitting each member of the AIME and his wife to attend one section meeting each year.

Nothing has received more attention than the shortage of technically trained men, said Prof. Spindler, in canvassing the problem from the technical education viewpoint. The industry has undergone a technical revolution and the engineering man-hour needs are way up.

The mining industry has done a poor job of getting the industry across or selling it. Scholarships alone are not enough. They must be supplemented by employment opportunities after graduation. Many other industries are more aggressive than the mining industry. Mining is not an urban industry and this must be taken into consideration. Conditions

of living and social surroundings also must be considered, Prof. Spindler emphasized.

From the pre-college public school viewpoint, Mr Winter said that it is necessary to have a good school system. Six steps in getting a good system are: (1) elect a good board of education; (2) establish or develop a philosophy of education; (3) provide adequate modern buildings; (4) get competent teachers, take them into community affairs and pay them well; (5) provide teachers with modern facilities; and (6) institute guidance and testing programs.

Speakers and their topics at the afternoon session were: L. E. Gillenwater, assistant executive secretary, State Water Commission of West Virginia, Charleston, W. Va., on West Virginia's coal washery waste abatement program; J. B. Benson, director of safety, Southern Coal Producers' Association, Washington, D. C., on what the coal mine safety program is facing in the future; and R. A. Cassell, division superintendent, and A. E. Sadler, assistant chief engineer, Pocahontas Fuel Co., Pocahontas, Va., on pillar mining with high recovery.

WASTE ABATEMENT

Before 1953, the state of West Virginia had no jurisdiction over coal waste. The original plan called for submission of reports on the various plants. When the new law was passed, the problem was how to handle waste from plants in operation when the law became effective, Mr. Gillenwater explained.

The commission decided to tackle the Coal River basin on a voluntary basis to eliminate waste inflow. This program has been effective and the stream is expected to be clear in a few months. Work also has been done on the Gauley, Elk and Bluestone Rivers and Elkhorn Creek, and work will soon start on the Guyandott, Mr. Gillenwater said.

The heart of any good system is a sump where solids can settle. Pumping waste behind a gob pile isn't too successful, but a lagoon dug in the ground is good. If the gob-pile method is used, it should be studied thoroughly. Water often comes through the pile with a black color. This can be helped by compacting the material to prevent channeling. Another disadvantage of the gob-pile system is that water going through it may become acid.

Considerable progress in waste abatement has been made in the past 2 or 3 yr. In July, 1953, there were 201 washers in operation in West Virginia and only 21 had adequate facilities for handling waste; 116 had none. In August, 1954, there were 190 plants operating and 26 had suitable facilities. By July, 1955, there were 197 plants and 42 had adequate facilities. In March, 1956, there were 197 plants in operation and 58 had satisfactory facilities, Mr. Gillenwater remarked.

FUTURE SAFETY

In the immediate future, management can expect still greater pressure from the mine workers, Federal and State inspection agencies for full and complete compliance with mining laws. The immediate future will see those directly concerned with safety, place more emphasis on the human element. It is a well known fact that human failure accounts for more than 90% of all mine accidents, Mr. Benson declared.

Recently the industry, together with various manufacturers, have been working on fixed overhead lighting. Excellent progress has been made and it is only a matter of time until most working faces will be illuminated as well as the average factory and shop. This vast improvement in mine lighting will contribute much to safety, Mr. Benson said.

The recent adoption of Schedule 28, Fire-Resistant Conveyor Belts," will contribute much to the future safety program by reducing fire hazards at belt installations. Another matter that is under study and should be a reality in the near future, is the development of a noninflammable hydraulic fluid for use underground. Another item that has been discussed and mentioned for future consideration is the development of a fire-resistant plastic coating, for spraying on the roof and ribs in lieu of rock dust.

The safety program of the future will advocate the use of permissible diesels underground. Diesels offer much in the way of safety. They carry their own source of power, thus eliminating power and trailing cables, a constant source of shock and fire hazards.

The safety program of the future will devote more time and attention to, and will ultimately restore discipline to its safety program. Discipline that is properly, honestly, and impartially applied is one of our most effective safety tools, Mr. Benson emphasized. On the other hand, discipline, that is improper, dishonest or partial, can prove to be a most deterrent factor in the safety movement.

There are some people in the industry who believe that the solution to the coal mine accident problem lies in the discovery of something entirely new or radically different. These people would like to point to a remedy such as portable canopy at each working face, which would prevent accidents from falls of roof, face and sides.

An intensive campaign was conducted last year to reduce the number of roof-fall accidents. The future will see still greater efforts along this line. The solution to the roof-fall problem is relatively simple. Investigation after investigation of roof-fall accidents invariably reveals lack of, or improper instruction, lack of discipline, inattention, unsafe practices, and mental and physical impairment or inefficiency, as most of the real causes of roof-fall accidents—which consistently account for more than 55% of all coal mine accidents. The same things that cause roof-fall accidents are the same things that top executives are able to control, and do control, insofar as they seriously and directly effect the cost and volume of production, Mr. Benson added.

An investigation of why many miners last year reduced their injury frequency rates to less than 10, will reveal that success did not depend entirely upon the guarding of machinery, providing of safety devices, posters, slogans, contests, prizes, safety meetings, or safety education, etc. While all these are necessary and essential to any coal mine safety program, they do not, and will not, in themselves, guarantee an accident free mine. A further study of the reasons for success at these mines will reveal that: First, the top executive recognized that an accident prevention problem existed at his company or mine, and, that it required a solution. Second, there was a will and determination on the part of the top executive to solve the problem. Third, he applied the solution. For example: lack of, or improper instruction that results in decreased or inefficient production and has a direct bearing on profit is readily corrected. This same cause accounts for many coal mine accidents. The remedy, in either case, whether it applies to production or accidents, is just the same. A fourth and important principle of accident prevention is that of top executive enforcement and placement of responsibility, and follow through of the application of the remedy, Mr. Benson declared.

All one needs to do is to look at the present production record of the industry to realize that immediate supervision of the workers is excellent insofar as it applies to cost and production. This same quality of foremanship, can and will eliminate preventable accidents, provided top executives make it crystal clear that they want the mines operated without accidents and that they are placing the responsibility for achieving success upon the foremen. We must not let our emphasis on the executive and supervisory responsibility for safety obscure the fact that there is a very profound responsibility on the part of the worker himself and on his union, Mr. Benson concluded.

PILLAR MINING

In discussing pillar mining in the Pocahontas No. 3 seam at the Itman mine of the Pocahontas Fuel Co., Itman, W. Va., Mr. Sadler said that mining equipment consists of 14 off-track conventional units, and one continuous miner, operating a total of 40-unit shifts daily. The conventional units consisting of one 14-BU loading machine, one 11-RU cutter and two 6 SC shuttle cars. A Lee-Norse, Model 36X continuous miner, and two 6 SC shuttle cars are used in the one section where continuous mining operations are performed. The normal crew on the conventional unit sections consists of 12 men, including the foreman; and on the continuous mining section, 8 men, including the foreman, is being used. Each operating section is provided with a separate ventilating air current induced by two Jeffrey Aerodyne fans, producing approximately 350,000 cfm at a 2.5 in w.g. In describing the area bounded by the Pinnacle and Micajah Mains, and extending from Long Branch Mains to Pinnacle Creek, Mr. Sadler said it is roughly 7,500 ft long and 3,000 ft wide; and contained, in place, approximately 3,900,000 tons of coal. With the exception of a narrow strip in the middle third portion of this area, practically all the coal has been extracted, and a recovery figure of 94% has been obtained.

In mining this area a barrier pillar 275 ft thick was established around the three sides adjacent to Long Branch,

Pinnacle and Micajah Mains. At intervals of varying distances this barrier was pierced by groups of multiple entries, and "butt off" entries driven around its perimeter. As mining progressed beyond the points serviced by these entries, they were provided with regulators, and served as "bleeders" for the mined-out gob areas. The air from these bleeders being conducted directly to the main return air courses. The coal in the barrier pillars is recovered simultaneously with the air course chain pillars, thus providing a well-balanced productivity rate, Mr. Sadler declared.

Pillars are extracted "open-ended" and roof support is provided by at least four rows of wooden posts set on 2-ft centers along the open side, with the outby row set slightly inby the edge of the pillar lift.

As a general rule, the pillar is attacked initially by taking two consecutive lifts from the heading, and then the remaining pillar is removed by consecutive lifts taken from the crosscut. By this method hazardous operations are reduced to three: the last cut in two pillar lifts and one "push out." Before each lift is started breaker timbers, generally four rows, are set on a slight angle in the heading to protect the haulageway. This procedure is also followed prior to the lifts being taken from the crosscut side of the pillar, Mr. Sadler explained.

Where conventional mining units are in use, six pillars are attacked simultaneously across a face approximately 550 ft long. By strict compliance with the established extraction sequence, the pillar lift approaches are always protected by being anchored to a solid pillar.

A somewhat different line of pillar extraction is maintained where continuous mining machines are in use. Here the barrier pillar or pillars are first split, as is done in the conventional loading unit sections, and a solid block left between the pillar split and the gob. The solid block on one side is then completely removed by consecutive lifts, followed by the removal, separately, of the two adjacent pillars. The miner then moves to the opposite side of the panel and the same procedure is followed to remove the solid block and two adjacent pillars from this side. This procedure leaves the two center pillars intact, and they are removed by taking consecutive lifts off each pillar until both pillars are totally extracted. By this method a flat pillar line of approximately 625 ft long is obtained.

The timbering plan in effect during development work with the continuous miner is practically the same as that adopted for the conventional mining unit except for a variation used during the simultaneous extraction of the two center pillars of the panel. Here, as the lift adjacent to the gob is removed from one pillar, multiple rows of breaker posts are installed in the mouth of this lift, to provide protection to the lift approach of the opposite lift; in addition, a single row of posts is also set along the side of the lift adjacent to the pillar.

Mr. Sadler said the company believes that the "open-end" method of pillar extraction, in the Pocahontas Coal Field, gives the following advantages not readily obtained in any other method:

1. Better ventilation of the face of the lifts is maintained.

2. The edges of the gob are more readily swept by the ventilating air current and there is less likelihood of methane accumulations adjacent to the working face.

3. Sprags of coal are not formed as in the "split and fender" method, and there is not the possibility of those sprags being left behind to possibly prevent "clean falls" in the mined out areas.

4. The elimination of the need of blasting, in areas in which most of the coal has been extracted, of the "sprags" and "fenders" to permit "free falling" of an unsupported area.

5. Reducing, by nearly complete extraction of coal, the possibility of overburden weight being transmitted from the gob area to the active working areas; thus minimizing the probability of "squeezes" and "bumping."

6. High percentage of recovery.

The Saturday morning program included a discussion of "The 'Ground Sentinel' for Ground-Fault Protection of Off-Track Mining Equipment," by B. H. Van Vactor, chief engineer, National Mine Service Co., Beckley, W. Va., and experience in "Dry Cleaning Fine Coal With the Brusset Vacuum Jig," by R. D. Wesner, acting general manager, Boone County Coal Corp., Sharples, W. Va. Chairman at the session was F. M. Morris, chief engineer, Clinchfield Coal Corp., Dante, Va.

GROUND FAULT PROTECTION

Acceptable ground-fault protection should provide effective and dependable protection against the following, declared Mr. Van Vactor:

1. Shock in event of insulation failure.

2. Shock resulting from contact between frames of adjacent equipment having a difference in potential.

3. Gas ignition through insulation failure or transfer of electrical currents between contacting frames of equipment operating near the working face.

4. Ignition of cable insulation and hydraulic oil and hose by excessive ground-fault currents.

Ground-fault protection required by the Coal-Mine Inspection Division of the USBM involved grounding machine frames through a grounding conductor in the trailing cable. The ground conductor created many problems for coal operators as well as the cable and equipment manufacturers. To meet the needs of coal-mining service, the twin-parallel cable with a rectangular-shaped ground conductor was developed. However, there are a number of objections to this type of cable, Mr. Van Vactor said.

The USBM, equipment and cable manufacturers and mine operators are familiar with the problems encountered with trailing cables having grounding conductors and much effort has been directed toward finding a solution. While new cable designs were being studied, an alternate solution to the problem of ground-fault protection was under investigation, Mr. Van Vactor remarked.

The "Ground Sentinel," developed by the National Mine Service Co., was evolved as a result of efforts directed toward a solution of the grounding problem. After passing USBM explosion tests, various units were field-tested underground. Under provisions of Bureau of Mines schedule 2F, the new unit is certified as meeting the explosion-proof requirements and now can be used as a component of permissible machines when authorization is obtained from the Branch of Electrical-Mechanical Testing, USBM, by the equipment builder, Mr. Van Vactor explained.

The Ground Sentinel is, in effect, a continuous resistance monitor. When installed on off-track mining machines, it continuously measures the resistance of the insulation while the machine is in operation. If the resistance falls below a predetermined value, control and headlight power are disconnected, thus stopping the machine and protecting the operator against the hazard of electric shock.

Since the current needed to operate the protective device is only 42 milliamperes and the time of operation is in milli-seconds, there is no danger of an incendiary arc when two machines are bumped together. Since a complete failure of the insulation is not needed to cause the device to operate, it will often forecast that weak insulation exists. Thus the point of weak insulation can be located and corrected before there is a complete failure, Mr. Van Vactor said.

In describing the Brussett Vacuum Jig, Mr Wesner said that it was dry-type coal cleaner for fine coal. The Boone County Coal Corp. was the first company in the U. S. to use the machine and first became interested in it in 1948. At that time the company was interested in using it to upgrade ¾x0 coal which was being loaded raw. When the mine changed from hand-loading to mechanical methods, the ash content increased.

Five Brusset units were bought in 1948 and installed in Boone County's cleaning plant. The jig is made up of two parallel inclined airtight decks with a reciprocating vane separating the jig at the top. As the vane moves back and forth, air is drawn up from alternate beds. Coal enters the center of each deck and is fed out by the action of the deck, Mr. Wesner explained.

Power units on the jig include a 20-hp motor that drives the vane through a 60-deg arc. A 7½-hp motor operates the deck through a Reeves drive and a 2½-hp motor drives four evacuators. Total demand is 21 hp, Mr. Wesner said.

Since there is no external source of air, there is no dust problem. The volume of air circulated in each machine is 310 cfm. At the peak of the exhaust stroke the vacuum pressure on the top of the deck is about 6 in w.g., while under the deck it is 2 in.

When the jibs were installed, each unit handled 30 tph of ¾x0 coal. But as more coal was loaded mechanically the raw product became dirtier. Therefore the company decreased the feed to 25 tph

(Continued p 168)



AMERICAN Heavy Duty "S" CRUSHER

CRUSHES ROM COAL, ROCK, SLATE, SULFUR BALLS AND GOB...WITHOUT OVERSIZE

A dozen installations of the new Heavy Duty "S" Crusher prove that it cuts labor costs by eliminating men at the picking tables.

It also offers important savings in recovered coal—coal that was formerly thrown away because of imbedded impurities. It is now crushed and washed for reclamation.

By cutting labor costs, by adding to your output, the new Crusher pays for itself in less than a year. From then on it's clear proft.

WRITE FOR LITERATURE.

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Designers and Manufacturers of Ring Crushers and Pulverizers

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Appalachian Meet *(Continued)*

and reduced the size to ⅜x0. Various other sizes also were tried, Mr. Wesner noted.

Moisture in the feed is an important factor in jig performance. Surface moisture should not be over 4% and if it is less than 2% the jig bed becomes too loose. Material that is too wet for air cleaning is sent to the Baum jig. In 1948, 10% of the coal was too wet for air cleaning. Now 50% of the coal is too wet for the air cleaners, Mr. Wesner added.

The Brusset jig plant is operated by one man whose duties include overseeing five screens, one belt and five jigs. He starts, stops, maintains, cleans and adjusts the units. It takes an average of ⅕ manshift to maintain the jig plant. Maintenance usually consists of replacing bushings, decks and air seals around the deck. Decks usually last 2,500 hr and are replaced in two manshifts. Eight bushings support each deck and each lasts about 3,500 hr. It takes four manhours to replace a bushing, Mr. Wesner remarked.

Four important factors in getting the most from the Brusset jig are as follows:

1. Feed must not exceed 30 tph for ¾x0, 25 tph for ⅜x0 and 22 tph for ¼x0.
2. Surface moisture of the feed must not exceed 4.2%, with an average of 3.75%.
3. Quality of the raw coal cannot vary widely.
4. Rate of beneficiation should not be expected to remove more than 65% of the reject without destroying the benefit of using the machine.

Cost of operating the Brusset jig is 9¼¢ per ton, when cleaning ⅜x0, including operation, maintenance and plant incidentals. A big advantage is the low cost of the machine and the comparatively small space required. The five units at Boone County Coal are housed in a 16x80-ft building, Mr. Wesner concluded.

Safety Job Ahead *(from p 160)*

Answering a question from L. H. Johnson, safety director, Peabody Coal Co., Mr. Hartman said that it has always been difficult to stop explosions when a large amount of float dust is introduced on dry rock dusted surfaces. On the other hand, in nearly all cases, it was possible to stop explosions when the float dust introduced was not excessive.

Speaking to Mr. Snell, George E. Bayles, mine inspector, American Re-Insurance Co., queried: "How do you account for variations in the percentages of incombustible contents in samples taken at 1-, 3-, 6-, 8- and 12-wk intervals?" Mr. Snell said that the answer was simple: "Samples are taken at different locations at different times."

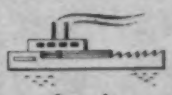
Paul M. Budzak, mine inspector, American Re-Insurance Co., asked Mr. Hartmann if dry rock dust of 65% incombustible content would arrest propagation when the combustible is float dust. After defining float dust as a very fine portion of coal dust (practically all 200M or finer), Mr. Hartmann said that 65% incombustible might stop propagation of an explosion if rock and coal dust were

Kleenslot

WEDGE WIRE PREPARATION SCREENS



mining



foods



chemicals



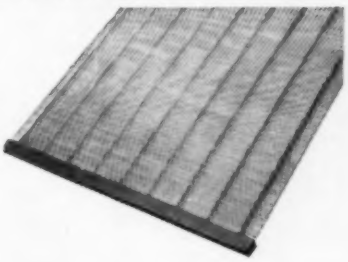
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oil

FOR DEWATERING, SCREENING, WASHING, EXTRACTING, FILTERING or SIZING APPLICATIONS



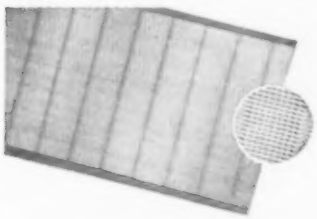


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A new innovation in the mining and industrial field. Particularly adaptable for use in flumes. The screen guard is built right into the screen and the vertical guard bars keep the larger lumps of material above the guard bars, permitting only the finer particles to pass over the screen. Special sizes can be furnished.

VIBRATOR SCREENS

They can be designed and adapted to fit any make of vibrator. You do not have to change your present machine to accommodate this screen. It is of quality construction and built to give maximum service. The rigid construction and method of installation prevents "whipping".





MARCEL-TYPE SCREENS

This screen is entirely different inasmuch as it is of a Marcel-type construction. It was designed for operations where slivers passing through are objectionable in the end product. This screen can be made in all sizes and shapes wherever applicable to higher and productive efficiencies. It gives long life and non-blinding operation.

ALUMINUM SCREENS

This aluminum screen has all of the attractive and sturdy features of many other metals. In addition, it offers flexing action that adds capacity and dewatering abilities which are almost unbelievable. No changes are necessary in the body of the screen to effect its installation.

NON-BLINDING — NON-CLOGGING - LONGER LIFE - MOST ECONOMICAL

The diagram at left shows all of the efficiency that can be furnished to you by KLEENSLOT Wedge Wire Preparation Screens, inasmuch as the wedge construction permits easy clearing. KLEENSLOT Wedge Wire Screens can be furnished in practically any type of metal. It costs nothing to obtain a Wedge Wire recommendation free of charge. Complete literature is available for the mining, oil, food, chemical and abrasives industry. There is a KLEENSLOT Wedge Wire Screen for every application.

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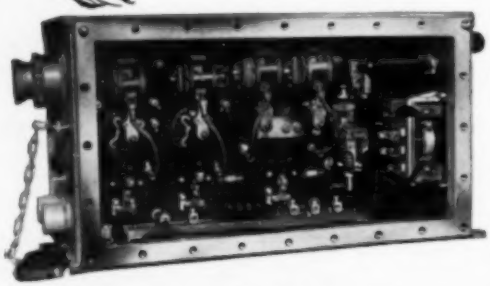


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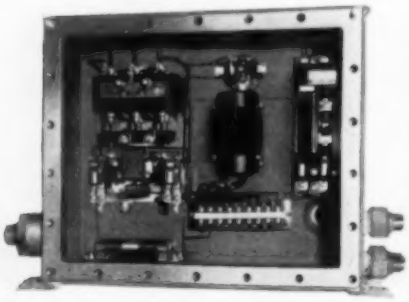
ELECTRIC STARTERS

Standard of the industry for safe and efficient starting of all types of heavy electrically operated mine machinery.



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Reduced Voltage Starter

Sturdily designed and dependably built for smooth, efficient operation of belt conveyor systems and other heavy mine equipment. Three point acceleration—reversing, with reversing switch interlocked to prevent plugging—Bureau of Mines explosion-tested enclosure. 20-30 HP, 230 Volt D.C. capacity.



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Bureau of Mines explosion tested enclosure—non-reversing with air circuit breaker and selector switch. Available in manual and magnetic reversing.

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Safety Job Ahead *(Continued)*

intimately mixed. But he added: "You must realize that it doesn't do that necessarily even with normal size coal dust of only about 20% or 200M. It may take up to 300 or 400 ft before the flame is completely arrested. If you didn't have the right amount of rock dust, you might have propagation for a distance of 1,000 or 2,000 ft throughout the mine."

Indiana's Safety Program

The nature and results of Indiana's program to reduce coal mine accidents were described in the final convention paper presented by Howard J. Batman, general manager and counsel, Lynch Coal Operators Reciprocal Assn., Terre Haute, Ind.

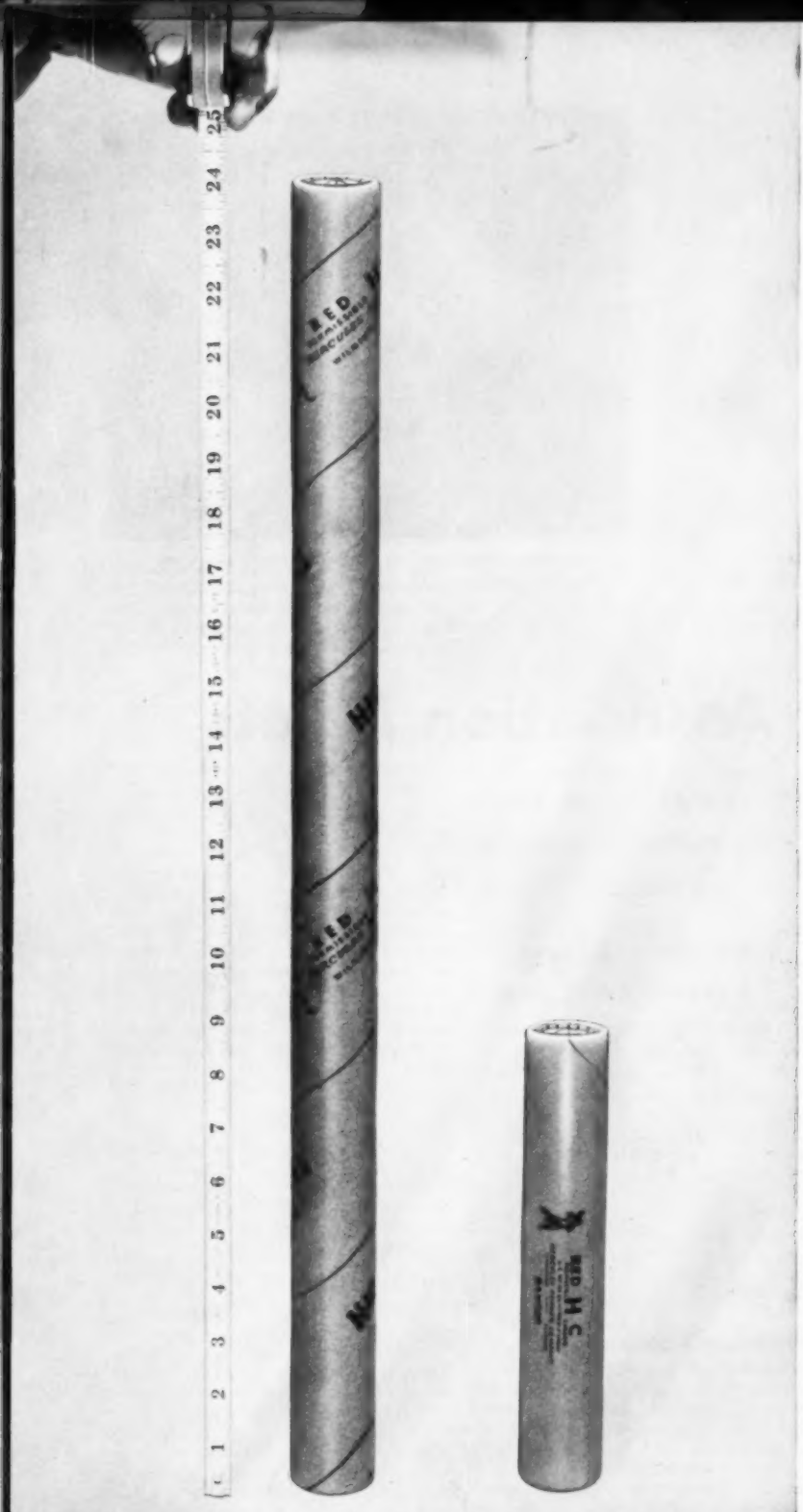
The Indiana Committee for Coal Mine Safety, formed in the fall of 1953, decided that:

1. A continuous educational campaign should be conducted on the causes of all accidents occurring in the mines related to the program.
2. There must be no punitive provisions of any sort.
3. Accident-prevention and first-aid training should be an important part of the program.
4. Public recognition and other rewards should be accorded those who build up noteworthy safety records.
5. Labor and management must continuously demonstrate sincerity of purpose.
6. Accident-prevention literature and posters should be fully utilized.
7. The Indiana mine laws should be recodified and brought up to date.

"We think we have definite and genuine proof that our (seven-point) program is paying off. Accidents in the past year have declined almost 50% and the production of coal in the mines where this program is being tried has been increased approximately 10%. We are greatly encouraged by the fact that all of the segments of the mining industry of Indiana have shown an intense feeling of cooperation centered on the fact that we can eliminate accidents in the shaft mines of our state. The spirit of our committee meetings is one of complete harmony. No subjects are discussed except those designed to promote safety.

"The fact that our eight largest shaft mines went 18 mo to the day without a fatality and that we have scored tremendous advances in the elimination of accidents has convinced the most skeptical of our groups that what was once regarded as impossible has in fact become a reality.

Arthur E. Bradbury took the floor and asked Mr. Batman how diagrams, photos or sketches of an accident can be used. In *Coal Age*, September, 1955, Mr. Batman said that an accident diagram was featured. With the caption, "Don't Let This Happen to You," the association had the diagram reproduced and posted on bulletin boards. Mining engineers can similarly post accident illustrations so that miners have an opportunity to see that such and such an accident happened.



THE LONG AND THE SHORT OF IT . . . Here is a new Hercules "King-Size" permissible cartridge—24 inches in length—shown alongside the same grade in the conventional 8-inch size.

NOW... "KING-SIZE" PERMISSIBLES

Hercules permissible powders packed in "King-Size" cartridges are now available for use in coal mines. Field tests of these new "King-Size" cartridges show that they have many advantages, some of which are:

- **A continuous column of permissible powder in bore holes minimizes misfires and reduces the hazard of unshot powder in the coal.**
- **Predetermined cartridge weights effect economies in the powder consumption.**
- **Uniformity in loading produces uniform breakage.**

Hercules "King-Size" cartridges are supplied in most permissible grades, in lengths from 12 to 24 inches and in diameters of 1¼ to 2 inches.

Our representatives are ready to discuss your explosives needs and to give more information on how the new "King-Size" cartridges can do more work for you at lower cost.

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XR55-8

HERCULES



MORNING SESSION—R. J. Vandewalker (left), W. F. and John Barnes Co.; R. J. Kirkpatrick, Westinghouse Electric Corp.; Russell E. Gibbs, Bradley University, session chairman; and Dan Heiple, LeTourneau-Westinghouse Co.



AFTERNOON SESSION—Harold B. Ratcliff (left), Bradley University, session chairman; J. J. Stolz, The Tool Steel Gear & Pinion Co.; Morton Sundnes, Bucyrus-Erie Co.; and J. F. Weis, Marion Power Shovel Co.

Open Pit Association Meets

Electrical controls, automation, gear design, wheel excavators and 6,900-v shovel equipment were major topics at 12th annual meeting

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

ELECTRICAL CONTROLS on dirt moving equipment, automation, new industrial controls, gear tooth contours, wheel excavators and performance of 6,900-v equipment were topics discussed by speakers at the 12th annual meeting of the electrical division of the Open Pit Mining Association at Bradley University, Peoria, Ill., June 7.

Over 131 electrical engineers and chief electricians from mining regions throughout the U. S. attended the technical sessions and saw a movie on productive maintenance. Meetings were held in the air-conditioned Jobst Hall auditorium in Bradley's new engineering building.

Other features of the program included a field trip to see the wheel excavator in operation at the Truax Traer Coal Co. and the association's annual banquet. "Sun, Sand and Transistor" was the topic of the talk at the banquet by Fred Wiedemann, Illinois Bell Telephone Co., Chicago. Officers for the coming year were elected as follows:

President—Howard Nunn, chief electrician, Ken Coal Co., Beaver Dam, Ky.

Vice President—R. T. Taylor, electrical engineer, Sinclair Coal Co., Kansas City, Mo.

Secretary-Treasurer—L. E. Briscoe, electrical engineer, Ayrshire Collieries Corp., Indianapolis, re-elected.

At the morning session, speakers and their subjects were Dan Heiple, chief field engineer, Le Tourneau-Westinghouse Co., Peoria, Ill., "Electrical Control of Dirt Moving Equipment"; R. J. Vandewalker, sales engineer, W. F. and John Barnes Co., Rockford, Ill., "Can It Be Automated?"; and R. J. Kirkpatrick, staff assistant, Director Systems Dept., Westinghouse Electric Corp., Pittsburgh, Pa., "CYPAK—a New Concept in Industrial Control." Dr. Harold Potter Rodes, president, Bradley University, welcomed the group, and Russell E. Gibbs, dean, College of Engineering, Bradley University, presided.

ELECTRICAL CONTROL

Electrical power for operating various components of earth moving equipment has been tested and used much in the past 10 yr, Mr. Heiple declared. Such control systems are simple and include a generator coupled directly and in line with the crankshaft of the diesel engine. Power from the generator is used to operate electric motors on the steering mechanism, raise or lower the apron of a scraper, raise or lower an end-dump truck body or perform similar auxiliary duties.

To be successful, Mr. Heiple said that the electrical control units must be: rugged to withstand abuse; weather worthy; simple to operate and maintain; highly productive; and able to make money for the owner.

The system operates on AC current to meet the requirements for successful operation. At 1,800 rpm, the generator provides 300-v 3-phase 120-cycle AC current. One transformer on the stator provides power for charging batteries and another is available for booster excitation as needed. A squirrel-cage induction-type motor was selected for the control work since high torque similar to that in a DC motor was needed, Mr. Heiple explained.

Limit switches and heat switches protect the controls against damage. The problem in applying electrical controls to earth moving equipment was essentially one of applying electrical principles to a specific problem. In conclusion, Mr. Heiple said that the possibilities with electrical controls have scarcely been scratched.

AUTOMATION

Automation is not new and did not suddenly come into being, declared Mr. Vandewalker, in opening his discussion. There is probably nothing that can't be automated, but there are many operations that won't be. Automation will come slowly and the rate of changeover will depend on how fast management can be convinced of its worthiness and shown that it is economical. The system also must pay for itself in a short time.

Citing examples of industries that are using automation at present, Mr. Vandewalker said that 16% of the current metal working operations can be automated, 20% of the aircraft industry output for the 1956-1957 period will be produced by automation and about 25% of the auto industry is automated. The

question of whether the coal industry can be automated and to what extent depends upon the men who operate the mines. Much has been done in preparation plants and a lot more will be done.

NEW INDUSTRIAL CONTROLS

To reduce downtime which costs up to $1,800 per minute in some plants, Mr. Kirkpatrick said CYPAK control units were developed. A CYPAK unit performs the work of a relay but has no moving parts; thus mechanical failures are eliminated. The unit differs from a relay in that a relay has one input with a number of outlets, whereas, CYPAK has many inputs and only one output.

Electric control circuits include four types of devices, Mr. Kirkpatrick explained. These are classed as (1) sensing; (2) logic or thinking; (3) output amplifier, and (4) output device. A CYPAK unit takes over the jobs of logic and output amplifying.

It is possible to get trouble-free controls by installing CYPAK units at a cost that is about 25% more than for conventional controls. The trouble-free devices are suitable for operations where more than five or six sequences are needed.

Speakers and their topics at the afternoon session included J. J. Stolz, assistant vice president, engineering, The Tool Steel Gear & Pinion Co., Cincinnati, Ohio, "Gear Tooth Contours"; Morton Sundnes, design engineer, Bucyrus-Erie Co., South Milwaukee, Wis., "Wheel Excavators"; and J. F. Weis, electrical engineer, Marion Power Shovel Co., Marion, Ohio, "Performance of 6,900-Volt Shovel Equipment." Prof. Harold B. Ratcliff, head, department of mechanical engineering, Bradley University, presided.

GEAR DESIGN

Gearing is a science but it requires art to make it practical, said Mr. Stolz, in opening his discussion on gear tooth contours. There are many variables that must be considered in selecting a particular gear, such as, space, ratio, velocity, load, tooth pressure, angles. quality of workmanship and operating practices.

With the aid of slides, Mr. Stolz explained such gear terms as pitch diameter, addenum, dedenum, corrected dedenum, base circle diameter standard and stub gears. The difference between 20-deg and 14½-deg gearing, both in standard and stub designs also was explained. Smoother operation and greater strength are possible with the 20-deg system. But bearing loading increases with the 20-deg design.

The change from cast-tooth gears to cut gears came about when form cutters were developed, Mr. Stolz pointed out. Noise is important today in gear operation and gears must be as quiet as possible. Development of the hobbing process makes it possible to produce a true involute gear.

WHEEL EXCAVATOR

In describing the wheel excavator, Mr. Sundnes said the machine originally was a European development and is one of two commonly used overseas for stripping lignite. Wheels move as much as 6,500 cu yd per hour in Europe and work to depths of 800 ft in areas with favorable ratios and material that can be handled easily.

Wheel excavators in the U. S. were designed differently from European models because of the variable material found in overburden in this country. Buckets must be large enough to handle coarser material and also must be stronger. Where the nature of the overburden is suitable, wheel excavators have proven themselves with respect to output, reach and economy of operation. (*Coal Age*, March, 1955, p 58; July, 1956, p 60.)

In describing the history of the wheel excavator in the U. S., Mr. Sundnes said that early results were encouraging and that the first machine was completed in 1944. Various problems were met with the machine and changes in the digging and conveyor assemblies were needed. As a result of the pioneering spirit shown by coal companies using the wheel, many improvements have been made to increase machine output and efficiency.

Some of the advantages of the wheel excavator pointed out by Mr. Sundnes include: better land reclamation because soil is placed on top; movement of material a distance of 380 ft; equal or lower power requirements than a shovel; light weight; easily replaced buckets; and belt maintenance costs only slightly higher than those for rope on a large dragline.

The wheel excavator is not considered to be a universal tool, Mr. Sundnes explained. It has its limitations as to the type of material it can handle. Use in this country will be restricted to specific areas because there must be a certain type of surface material that can be moved efficiently with the wheel.

HIGHER VOLTAGE

Thus far there have been no serious problems with 6,900-v power, said Mr. Weis in opening his discussion of the performance of 6,900-v shovel equipment. The minor trouble experienced with the first machine was the result of a mechanical defect which was readily corrected.

On the subject of power distribution, Mr. Weis said that the 6,900-v power is fitting into the picture as well as 4,000-v power did in the past. Plugs, sockets and cables are performing well.

The big 60-yd shovel in operation at the Hanna Coal Co. is working out unexpectedly well. The giant machine has a peak demand of 6,800 to 7,000 kw and has a total of 4,650 hp. However, the short period it has been in operation does not prove there will be no problems. But if any should develop, Mr. Weis said they definitely can be overcome.

Before deciding to use 6,900-v power, Mr. Weis said that considerable thought was given to 13,000-v equipment. Some of the objections to the higher voltage were: lack of space for proper clearance; higher cost; unknown addition hazards; and load machines. If 6,900-v equipment proves to be as trouble free as present experience indicates, higher voltage may be used in the future. There also is the possibility that loading shovels will be run at lower voltage while stripping machines operated at the higher values.

Report from Bluefield . . .

Coal Equipment Attracts 62,000

Some 62,000 spectators, a record, turned up at the 3-day (May 23-25) Southern Appalachian Industrial Exhibit, or the Bluefield (W. Va.) Coal Show, last month to examine, to observe and, in many instances, to buy some of the mining and allied equipment being exhibited by manufacturers from 30 states. In fact, early reports indicated that several million dollars worth of heavy equipment, tools, electrical and safety devices had been sold during the show.

During opening day ceremonies Concord College junior Eileen Ryan, Gary, W. Va., was crowned Queen Bituminous XIII (photo). On Friday, the final day of the show, Tom Pickett, executive vice president of the National Coal Association, addressed the Pioneer Miners Club reunion. Later in the day gadget contest winner W. M. Goad, coal inspector for the New River and Pocahontas Consolidated Coal Co., Berwind, was awarded first prize for his scale-model oil-flow regulator and control. The gadget automatically regulates oil treatment to variations in coal volume as the coal is loaded on to conveyors. In another final day highlight Perry Mosely, U. S. Steel, Gary, turned back 75 entries in a fossil contest with a 200-lb tree- and leaf-imprinted rock slab.

Show officials included James B. Wooldridge, Jr., director; H. E. Mauck, general chairman; W. L. Osborne, vice chairman; J. W. Pero, Pioneer Miners Reunion; William P. Schrinner, Miners Gadget Committee; Frank Hancock, Fossil Committee; Randel Bond, registration committee; Jack Adams and H. Edward Steel, publicity committee. The show was sponsored by the Pocahontas Electrical and Mechanical Institute.

Equipment and services exhibited at the show included the following:

Acme Machinery Co., Williamson, W. Va.—air compressors, twin-arm Jumbolter, drill steel, sump pump, impact wrenches, chain saws.

Allegheny Ludlum Steel Corp., Carmet Div., Brackenridge, Pa.—roof and undercutting bits.

Allis-Chalmers, Advertising Dept., Milwaukee, Wis.—solids-handling pumps, distribution transformers, car shakers, electric motors.

Alloy Rods Co., York, Pa.—electrodes.

American Mine Door Co., Canton, Ohio—"Little Chief" wet or dry rock duster, mechanical track cleaners, mechanical and air-powered ventilation doors, car transfers, "Quick-On" cable splicers, cable vulcanizers, electric and airpower track switch throwers.

American Steel & Wire Div., U. S. Steel, Pittsburgh, Pa.—trailing cables for mining machines, cables for shovels, draglines, wire ropes ⅝ in to 1⅝ in.

Anaconda Wire & Cable Co., New

York, N. Y.—mine cable, trolley wire, aluminum feeder cable.

Appalachian Electric Power Co., Bluefield Div., Roanoke, Va.

Armco Drainage & Metal Products, Inc., Middletown, Ohio—Helcor spiral corrugated, spiral-welded, corrugated, asbestos bonded pipe, tunnel liner (69x92 in).

Ashland Oil & Refining Co., Ashland, Ky.—mine lubricants, "Permatreat" coal spray.

Automotive Supply Co., Bluefield, W. Va.—United Motors system, Delco-Remy batteries, Hyatt bearings, twin jack lifts and safety lane equipment, Ingersoll-Rand air and electric impact tools, Aro greasing equipment, Pennzoil oils and greases, Kellogg air compressors, Curran degreasers and cleaners, Hunter wheel balancers and aligners, Marquette electric welders, Pullman vacuum cleaners, Dayton fans, belts and hose, Perfect Circle piston rings, tapered shims, AC spark plugs, filters and fuel pumps, National Carbon's "Prestone," Heineke's Monarch power lawn mowers, Hein Werner floor and portable jacks, Heyer battery chargers, Black & Decker electric drills and valve equipment, Aeriol steam cleaners.

Banks Miller Supply Co., Huntington, W. Va.—Manheim's Veelos link V-belts,Vascoloy Ramet bits, Airtite demountable metal stoppings, U. S. Royal demountable solid shuttle car tires, Ingersoll-Rand's torque control torsion bar impact tool, Simplex cables, Bradley Harrison neoprene molded electric connectors, Ingersoll-Rand power hammer, Plymouth diesel Mine-o-Motive, Diamond roller chains and sprockets.

Bearing Service, Inc., Pittsburgh. Pa.—CB3 conveyor bearing, ball and roller bearings.

Bethlehem Steel, Bethlehem, Pa.—roof bolts, mine bolts, non-yielding arches and yielding arches.

Bixby-Zimmer Engineering Co., Galesburg, Ill.—Bee-Zee screens, Iso Rod screen in 1/16-, 3/32- and 1/8-in openings (stainless steel).

Black & Decker Mfg. Co., Towson, Md.—1/16-in Super-Service valve refacer, No. 65 vacuum cleaner, No. 11 jig saw and portable power tools.

Blackhawk Mfg. Co., Pittsburgh. Pa.—Blackhawk "power-packed" jacks, Portapower hydraulic tools, hydraulic tools, aluminum alloy cast 90-deg pipebender (one bend), hydraulic rescue equipment, electric-hydraulic pump.

Bluefield Hardware Co., Bluefield, W. Va.—Wiegand "Chromolox" home electrical resistance heating, fan-type ceiling "Thermwire," Sherwin-Williams paints, Economy fuses, Fafnir bearings, MRC bearings, Killark conduit fittings, Dodge bearings, Falk gear reducers and couplings, Chicago Rawhide C/R oil seals and rawhide pinions, Bird "King Tab" shingles, Union drive and conveying chains and sprockets, Aeroquip flexible hose lines, detachable and reusable fittings, Thomas flexible couplings, Cone-Drive gears, speed reducers, No. 2800 silicon-rubber discharge tube-equipped compressor, Carlon flexible and rigid plastic pipe.



CROWNING EVENT at the Bluefield Coal Show came opening day (May 23) when Concord College junior Eileen Ryan, Gary, W. Va., was crowned Queen Bituminous XIII by Ann Francisco, coal show queen in 1954. Young ladies above are Phyllis Ann Howe (left), Bluefield, W. Va.; Loretta Ann Hurst, Dott, W. Va.; Miss Ryan, Gary, W. Va.; Miss Francisco, Pocahontas, Va.; Fay Shumate, Worth, W. Va.; and Judy Rasnick, No. Tazewell, Va.

Bluefield Supply Co., Bluefield, W. Va.—General Electric "Kinamatic" DC motor, "Tri-Clad" motor, starting switches and limit switches, wires, cables and splicing materials. Steel Products Engineering's (Combustioneer Stoker Div.) commercial modulating stokers, domestic home equipment, the "Combustioneer."

Boston Woven Hose & Rubber Co., Pittsburgh, Pa.—conveyor, elevator, transmission belting and hose.

Burndy Engineering Co., Norwalk, Conn.—terminals, splicers and connectors.

Call, Ray C., S. Charleston, W. Va.—International TD-12 bulldozer and Gar Wood blade, Euclid dump 91FD, Euclid S-7 scraper, Le Roi tractor, Cleveland percussion air drill, Cleveland auger type rotary drill, Koehring 305 ¾-yd shovel, Cleveland mobile wagon drill, American Tractor's "Terratrac" and "Terra-Loader," General Motors diesel generators.

Carboloy Mining Tools, Detroit, Mich.—bits.

Cardox Corp., Chicago, Ill.—Airdox, semi-portable auger, general purpose drill with power-take-off or power package.

Carlon Products Corp., Cleveland, Ohio—flexible and rigid polyethylene piping, demonstration of new application by teaming Victaulic quick couplings with carbon "L" rigid pipe for air lines.

Centrifugal & Mechanical Industries, Inc., St. Louis, Mo.—centrifugal dryer.

Charleston Electrical Supply Co., Charleston, W. Va.—Ohio Brass shell and plug for roof-bolting, "Magna-trip" circuit interrupter, automatic mine car couplers, line materials, rail bonds, trolley taps, rail bonds, Diamond conveyor chain, roller links, connecting links, Goodyear industrial hose, belt and mechanical rubber goods, Allis-Chalmers equipment, Falk gear reducers, motor reducers and couplings, Dage industrial television, Ebco water coolers, Prox cutter chains and bars, Anaconda wires and cables, Charleston Electrical field and armature coils, Allen Bradley motor controls, starters and switch gears.

Chicago Pneumatic Tool Co., New York, N. Y.—drills, impact tools, roof-bolting drills, air and hydraulic coal drills, sump pumps, stopers, sinker drills, electric and air drive maintenance tools.

Compton, Inc., Clarksburg, W. Va.—Models 28, 48 coal augers.

Coppinger Machinery Service, Bluefield, W. Va.—Smith welding machines and chargers, mining machine replacement parts, Federal-Mogul Bower bearings.

Cross Sales & Engineering Co., Greensboro, N. C.—Aeroquip hose, detachable and reusable fittings.

Diesel Injection Sales & Service, Inc., Salem, Va.—fuel injection systems, hydraulic governors, hose, cylinder heads, hydraulic starting systems.

Dixon Crucible Co., Joseph, Jersey City, N. J.—Dixon paints and lubricants, No. 95 Graphokote, quick-drying graphite lube for haulage locomotive pedestal jaws and wear-sides of journal boxes.

Du Pont de Nemours, E. I., Wilmington, Del.—paints.

Duquesne Mine Supply Co., Pittsburgh, Pa.—Marlo metallic packing. "Marlo Prene," Stockdale acid-resisting pump and foot-valves, trolley taps, nips, overhead line materials, section switches, "Redipt" bolts and forgings, slider pull-heads.

Eastman Atlantic Mfg. Co., Wilmington, Del.—hydraulic hose couplings, adapter unions—NPTF, JIC, SAE, two-piece reusable coupling.

Ensign Electric & Mfg. Co., Huntington, W. Va.—"Groundicator" and electrical control equipment.

Enterprise Wheel & Car Corp., Bristol, Va.—mine cars.

Esso Standard Oil Co., Beckley, W. Va.—greases and lubricants.

Femco, Inc., Irwin, Pa.—fluorescent portable mine light, magnetic limit switch, pump control and indication system.

Firth-Sterling, Inc., Pittsburgh. Pa.—cutting machines and carbide drill bits.

Flexible Steel Lacing Co., Chicago, Ill.—belt splicing fasteners.

Gates Rubber Co., Sales Div., Cincinnati, Ohio—rubber hose, sheaves, "Vulco" V-belts, hose couplings.

General Cable Corp., New York, N. Y.—wire and cable.

General Electric, Lamp Div., Pittsburgh, Pa.—mercury lighting, infrared lamps, sealed beam lamps, industrial reflector lamps and fluorescent lamps.

General Electric Co., Trumbull Components Dept. and Distribution Assemblies Dept., Norwood, Ohio—safety switches, circuit breakers, residential protective equipment, centralized motor controls and busways.

General Splice Corp., Beckley, W. Va.—Minet hinge belt splicing, Gates Engineering neoprene coatings and sheet linings, pulley laggings.

Goodman Mfg. Co., Chicago, Ill.—mining equipment, rope conveyors, loaders, shuttle cars, continuous miners and the Wilcox miner.

B. F. Goodrich, Akron, Ohio—rubber hose, conveyor belting, fire-resistant "Caricoal" V-belt (acceptance No. 28-6).

Goodyear Tire & Rubber Co., Inc., Cincinnati, Ohio—flat transmission and conveyor belting, industrial rubber V-belting, hose, roof bolts, compression pads and tires.

Gorman-Rupp Co., Mansfield, Ohio—centrifugal mine pumps.

Goyne Pump Co., Ashland, Pa.—assorted silt disposal pumps.

Gulf Oil Corp., Pittsburgh, Pa.—mining machine lubricants.

Guyan Machinery Co., Logan, W. Va.—resistors and hydraulic equipment rebuilding service.

Harris Pump & Supply Co., Pittsburgh, Pa.—Weatherhead products.

Hayes Metal Products, Hi Hat, Ky.—24-T dump-it-yourself trailer on a Ford F-800 chassis.

Hendrick Mfg. Co., Carbondale. Pa.—perforated, wedge-slot screens, grating and steel flooring.

Hewitt-Robins, Inc., Stanford, Conn.—"RoBINtronic" level indicator, "Eliptex" dewaterizer belt conveyors, Jones speed reducers, screens and car shakeouts.

Heyl & Patterson, Inc., Pittsburgh, Pa.—H&P cyclone, Reineveld centrifugal dryer, model of typical recovery system.

Huff Printing Co., Inc., Bluefield, W. Va.—office machines, Pierce dictating and adding machines, carbons, ribbons, Clary adding machines, Columbia Ribbon & Carbon duplicating products.

Huntington Supply & Equipment Co., Huntington, W. Va.—Tool Steel Gear & Pinion Co. gears, Nolan car dump, Cincinnati Mine Machinery cutting machine bits, chains and sprockets.

Insulation & Wires, Inc., Ft. Wayne, Ind.—Products of John A. Manning, N. J. Wood Finishing Co., Permacel, Athens-Pearce Mfg. Co., Kirkwood Commutator, P. D. George Co., Essex Wire Corp., MacAllen Co., National Vulcanized Fibre, Kirkwood Carbon Corp.

Ideal Industries, Inc., Sycamore, Ill.—set screw wire connectors, crimp connectors with "Wrap-Cap" insulator, wire nuts, motor maintenance equipment, wire lubricants, voltage tester and fish tapes.

Jeffrey Mfg. Co., Beckley, W. Va.—loading machines, shuttle cars, chain conveyors, continuous miners, cutting machines and locomotives.

Joy Mfg. Co., Pittsburgh, Pa.—mobile parts truck.

Kanawha Mfg. Co., Bluefield, W. Va.—Heyl & Patterson cyclone, Reinevelt Centrifugal dryer, model of typical recovery system.

Keenan Oil Co., Cincinnati, Ohio—"Keenoil 7."

Keesee & Co., W. R., Bluefield, W. Va.—Dodge trucks and Power Wagons.

Kennametal, Inc., Bedford, Pa.—percussion bits, rotary bits, mining machine and churn bits.

Kersey Mfg. Co., Bluefield, Va.—Model PC-1 one- or two-man battery-powered, 3-wheel personnel car; Model 444-WT, 4-wheel drive tractor with forward and reverse speeds, 24 in high, 70 in wide, 11 ft 4 in long, for use with Kersey bottom dump coal cars; Model 55 BD bottom dump, 55 cu ft level, two ton capacity, 13 in sides, 6-in ground clearance; Gould batteries.

Keuffel & Esser, Hoboken, N. J.—automatic level transit, surveying instruments, slide rules, technical reproduction tools and supplies.

King Powder Co., Inc., Cincinnati, Ohio—"Red Crown" explosives.

Koppers Co., Inc., Wood Preserving Div., Pittsburgh, Pa.—"Pressure-Creosoted" wood treatment.

Lecco Machinery & Engineering Co., Bluefield, W. Va.—"Lecco-Vib" double-deck vibrating screen.

Lee-Norse Co., Charleroi, Pa.—continuous miners, mining equipment, man-trip carriers.

LeRoi Div., Westinghouse Air Brake, Cleveland, Ohio—stopers, airlegs "Vac-Nu-Matic" air drills and drill steels, bits.

Link-Belt Co., Chicago, Ill.—power-transmission equipment, conveyors and conveyor rolls, screens, Multi-Louvre drier, coal-preparation and handling equipment.

Long Co., Oak Hill, W. Va.—Model 188 loading machine, Model 88 pig-loader, piggyback conveyors, mobile conveyors, skid-mounted chain conveyors.

Machinery, Inc., Charleston, W. Va.—Schramm "Pneumatractor with backhoe and front-end loader, Schramm loader drill, MRS tractor, Titan power saw, Chain Belt Co.'s Rex pumps, Talbert removable gooseneck trailers, Ka Mo earth-boring equipment, Owen clamshells, Hydramotive's "Hydrotor," Petti-bone Mulliken Model 175 1¾ yd "Speedall" tractor-shovel, Universal "Wobbler," Maginess concrete vibrator, Lima shovel, Wayne sweeper, Bantam crane, Reich overburden drill, Parmanco highwall drill, Gardner-Denver diesel 600 rotary air compressor, rubber-mounted "Air Trac" drill carrier with chain feed drifter WBH vertical air compressor, line oilers.

Mack Motor Truck Corp., Philadelphia, Pa.—dump truck. Planidrive dump truck with a Baker body.

Maley Engineering Sales, Charleston, W. Va.—Union Chain's drive and conveying chains and sprockets.

Marathon Coal Bit Co., Montgomery, W. Va.—drill steel, bits, cutting machine bits, "Proto" tools, hollow drill steel, special gearing.

Marchant Calculator, Inc., Bluefield, W. Va.—calculators.

Marion Handle Mills, Marion, Va.—hickory axe, hammer, pick handles, Virginia Hickory Products smoke rings.

Marshall Equipment Co., Inc., Huntington, W. Va.—Sterling mine car wheels, track rollers, car repair parts, tractors shovels, Pennsylvania Electric coils.

McLanahan & Stone Corp., Hollidaysburg, Pa.—coal-crushing equipment.

McNally Pittsburg Mfg. Co., Pittsburg, Kan.—preparation plants, auxiliary equipment, newly-designed Drycyclone.

Mine Safety Appliances Co., Bluefield, W. Va.—first-aid materials, methane detecting instruments, protective clothing, Bantam 400 rock-dust, Edison electric cap lamps, breathing apparatus, D-55 mine-phone, dust collectors for roof drilling, flame safety lamps and the R-4 trip lamp.

Mining Machine Parts, Inc., Cleveland, Ohio—gears, chain and mercury switches.

Mosebach Electric & Supply Co., Pittsburgh, Pa.—"Grease type" brake adjuster, mining cable shock absorber, trolley taps and cable protectors.

Motorola Communications & Electronics, Inc., Chicago, Ill.—two-way radios.

National Electric Coil Co., Columbus, Ohio—resin, vacuum-impregnated windings and coils.

National Mine Service Co., Beckley, W. Va.—Joy rebuilt controller, Permiseal plugs, Joy repair parts, Koehler flame safety lamps, Wheat electric cap lamps, Riken gas indicators, NMS rebuilding service.

National Motor Bearing Co., Van Wert, Ohio—oil and grease retainers, O-rings for mining equipment.

Newcomer Products, Inc., Pittsburgh, Pa.—carbide mining tools, cutting bits, drill bits, square-nose finger bits and roof drill bits.

Nordberg Mfg. Co., Milwaukee, Wisc.—vibrating screens, bar grizzlies and the Symons V-screen.

Norfolk & Western Ry.—coal-carrying hoppers, railway coach theater.

Ohio Brass Co., Mansfield, Ohio—trolley supplies, roof bolts, switchgear.

Ohio Carbon Co., Cleveland, Ohio—carbon brushes.

Okonite Co., Passaic, N. J.—Hazard insulated cables, tapes and "Red Saddle" shuttle car cables.

Pattin Mfg. Co., Marietta, Ohio— mine roof bolts, slot and wedge bolts, bolt and expander shell.

Pennsylvania Electric Coil Corp., Pittsburgh, Pa.—coils.

Persingers, Inc., Charleston, W. Va.—Dodge torque-arm reducers, "Flexidyne," taper lock sheaves, conveyor pulleys, sprockets, couplings, pillar blocks and takeups, Persinger pre-fab belt conveyors.

Persinger Supply Co., Williamson, W. Va.—Dodge power transmission machinery, Continental gin conveyor machinery, Clarkson "Red Bird" chain, Chicago pneumatic tools, Carmet Carbide mining tools, McLaughlin drilling, Acme Machinery self-propelled hydraulic power unit, Simplicity 3x6 Model LS gyrating screen.

Pittsburgh Screw & Bolt Corp., Pittsburgh, Pa.—split-rod, wedge and expansion roof bolts, structure joints.

Platnick Bros., Bluefield, W. Va.—

plates, angles, steel products and steel erection.

Pocahontas Welding Supply Co., Bluefield, W. Va.—All-State welding alloys, Hobart motor generation welders, Linde welding supplies and Stoody hardfacing alloys.

Post-Glover Electric Co., Cincinnati, Ohio—P-6 steel grid resistors, M2 headlight control switch, automatic transfer switches, reel motor, contactor switch.

Preiser Co., Inc., B., Charleston, W. Va.—technical supplies and chemicals.

Pure Oil Co., Bluefield, Va.—"Purelube" greases and oils.

Reich Bros. Mfg. Co.—overburden drill.

Reid Belt & Rubber Co., Bluefield, W. Va.—belt repairing and rebuilding.

Reliance Electric & Engineering Co., Cleveland, Ohio—electric motors and gear motors.

Rema Distributors, Inc., Beckley, W. Va.—self-vulcanizing rubber materials.

Republic Steel Corp., Cleveland, Ohio—roof bolts with rubber washer, plastic pipe.

Riggs Engineering Co., Ludlow, Ky.—Trabon centralized oil and grease system.

Rish Equipment Co., Bluefield, W. Va.—International diesel electric sets, bulldozers, end dump trucks, Drott "4 in 1" skid shovel, P&H crane, Ingersoll-Rand compressor, Barber-Greene elevator conveyor, Hough payloader, International tractor with Henry front-end shovel loader and backhoe and Salem Tool's McCarthy coal recovery augers.

Roberts & Schaefer Co., Chicago, Ill.—preparation equipment.

Roeblings Sons, John A., Trenton, N. J.—electrical wire, cable and "Royal Blue."

Rome Cable Corp., Rome, N. Y.—wires, cables, conduits.

Rust-Oleum Corp., Evanston, Ill.—Rust-preventive paints and coatings.

Ryerson & Son, Inc., Joseph T., Chicago, Ill.—bars, structurals, plates, sheets, tubing, alloys, stainless steels and color-marked steels.

Sanford-Day Iron Works, Inc., Knoxville, Tenn.—mine cars and Brown-Fayro hoists.

P. J. Schaeffer, Cleveland, Ohio—iron powder welding electrodes.

Schroeder Bros., Pittsburgh, Pa.—coal and rock drills, car spotters, automatic loading stations, Model LF-18-B continuous return line filter with 5 micron filtration, Model TB-25-B hydraulic test bench.

Skil Corp., Chicago, Ill.—portable electric tools, No. 367 6½-in, 1½-hp saw to cut 2x4's at 45 deg; Model 592 orbital finishing sander.

Smith Welding Equipment Corp., Minneapolis, Minn.—oxygen-acetylene welding and cutting equipment.

Socony Mobil Oil Co., Inc., Baltimore, Md.—oils and greases distributed by Kanawha Valley Oil Co., Blue Grass Oils, Davis Distributing Co. and Mathews Bros.

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report

Southern Oxygen Co., Bluefield, W. Va.—Miller welding machines, Victor oxy-acetylene outfits, Glendale Optical welding supplies and safety equipment, C-O-Two fire extinguishers, Scott Air-Pak and Remington Arms stud driver.

Stammler Corp., W. R., Paris, Ky.—hydraulic car-spotters, hydraulic automatic loading station.

Sterling Steel Casting Co., E. St. Louis, Ill.—mine car wheels, track collars, repair parts, tractors and shovels.

Talbert Equipment Construction Co.—removable gooseneck trailers.

Templeton Kenly & Co., Broadview, Ill.—mechanical and hydraulic jacks, Re-mo-trol hydraulic center-hole rams, solid rams, pumps, Briggs & Stratton four-cycle gasoline engine, roof and timber jacks.

Texas Co., Norfolk, Va.—Texaco oils and greases.

Timken Roller Bearing Co., Canton, Ohio—Timken tapered roller bearings, carbide insert and multi-use drill bits. Timken TTC tapered-socket for feed-log machines and light stopers.

Toledo Pipe Threading Machine Co., Toledo, Ohio—pipe threading machines and tools.

Tracey Co., Bertrand P., Montgomery, W. Va.—Goodman, Jeffrey and Sullivan mining machine parts, locomotive gears and pinions, shuttle cars, cutting chains and cutting bars.

Union Wire Rope Corp., Ashland, Ky.—sockets, slings and rope accessories.

U. S. Rubber Co., Electrical Wire & Cable Dept., Mechanical Goods Div., New York, N. Y.—electric wire and cable.

U. S. Steel Supply, Pittsburgh, Pa.—special steels, alloy bars and heat-resisting stainless steels.

Valley Machine & Electric Shop, Inc., Fairmont, W. Va.—metallizing, Michaelson rotary dump mine-car cleaner; representative of Independent Electric of Washington machine work, metallizing, motor repair and rewinding; distributor of Lincoln weld rod, equipment and accessories; Pittsburgh Gear Co. gears, pinions, shafts and parts; and West Virginia Carbon Co. carbon and graphite brushes.

Victaulic Co. of America, Elizabeth, N. J.—standard, light-weight, snap-joint and "Roustabout" couplings, fittings, "Vic-Groover" tools, "Wheel-Ezy" piping method for joining thin wall pipe and tubing.

Virginian Electric, Inc., Charleston, W. Va.—Products of Aurora Pump Co., The Miller Co., John A. Roebling, Joy Mfg. Co., Kaiser Aluminum, General Cable, Crouse-Hinds, Rome Cable Corp. and Holophane Co.

Weatherhead Co., Pittsburgh, Pa.—swaged hose assemblies, hydraulic hose fittings, reusable hose ends, Weatherhead brass and steel tube fittings, swaging machine WMD30 and Ermeto fittings.

Wellman Co., S. K., Bedford, Ohio—automatic transmission disks, metal clutch plates, facings and brake linings, Feramic brake blocks.

Westinghouse Electric Corp., Philadelphia, Pa.—Life-Line A motor (1 hp), 5-kva core and coil Break Jaw knife switch, Life-Line starter, push-to-test indicating light, DB in-line gear motor and DYNAC controller to electrically brake AC motors.

West Virginia Armature Co., Bluefield, W. Va.—"CERCO" armature undercutter, bronze bearings, armature and field coils, hydraulic pump repairs, sealed beam headlights and electric replacement parts for mining equipment.

West Virginia Steel Corp., Charleston, W. Va.—translucent structural panels, industrial roofing and siding, steel grating and treads, structural steel products.

West Virginia Steel & Mfg. Co., Huntington, W. Va.—steel rails, ties, roof bolts, switches, frogs and reinforcing concrete bars.

West Virginia Tractor & Equipment Co., Charleston, W. Va.—Lycoming air-cooled gasoline engine, Model 2; Murphy diesel, ME-6; Michigan tractor Model 125A; H&L teeth for drag and shovel.

Williams, Andy, Inc., Bluefield, W. Va.—Ford trucks.

Wilmot Engineering Co., Hazleton, Pa.—dense media washer.

Other service and safety exhibitors included:

Area Development Corp., Bluefield, W. Va.

McDowell Vocational School.

Raleigh Junk Co., Beckley, W. Va.

United States Bureau of Mines, Mt. Hope, W. Va.

West Virginia Dept. of Mines, Charleston, W. Va.

West Virginia Heart Association, Charleston, W. Va.

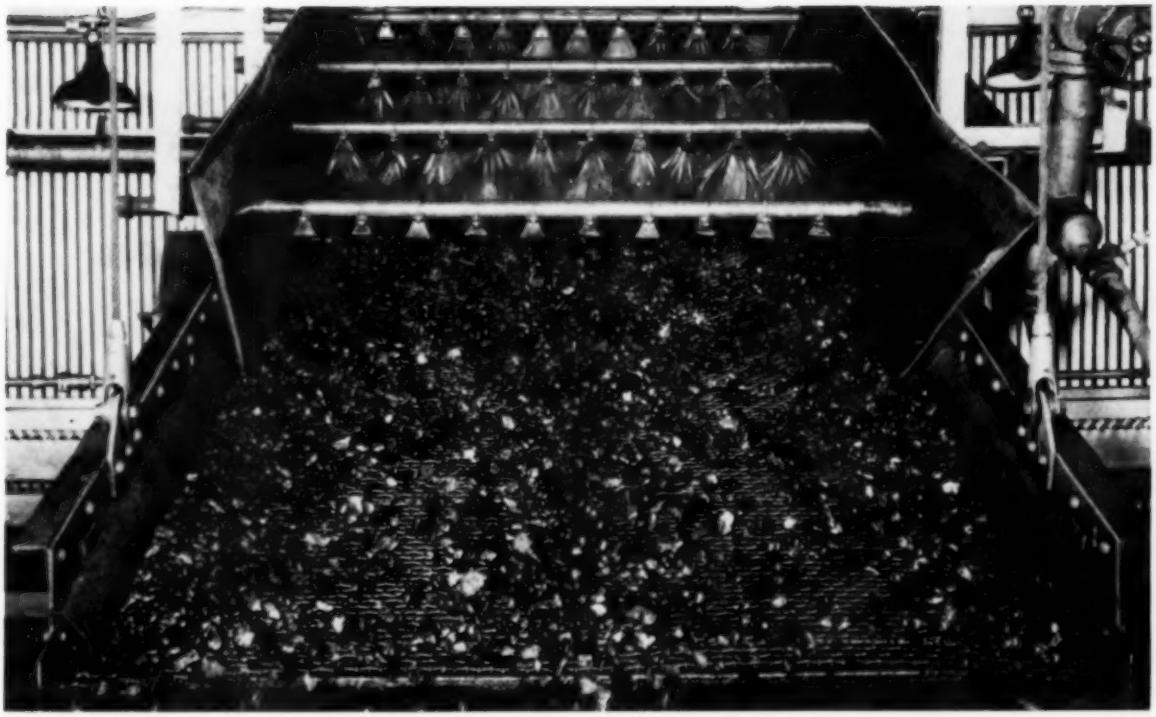
West Virginia Industrial & Publicity Committee, Charleston, W. Va.

West Virginia School of Mines, Morgantown, W. Va.—West Virginia State College.

NCA Convention *(Continued)*

portation. The petroleum industry developed tanker and pipeline transport. The chemical industry has got to the point where it now transports chemicals by tanker.

"Just think what cheap transportation of coal could do for you. If you could find a way of transporting it at one-half of what the railroads can afford, wouldn't that be a wonderful boon for the coal industry? After all, the coal industry is your livelihood. Whether it is going to be nice and comfortable or drab and dreary I would think depends very largely upon you, not upon somebody else."



At coal processing plants throughout the nation, Wissco-Loy Screens are the choice for sizing operations. ***It's because...***

...WISSCO-LOY® SPACE SCREENS

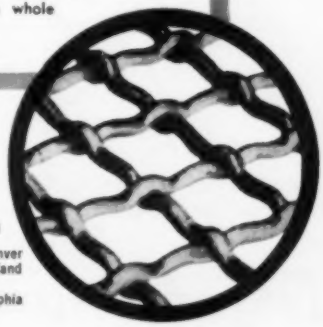
are economical, yet tailor-made for the job!

There's an easy way to help reduce your cost per ton of material screened—just switch to economical Wissco-Loy Space Screens.

Although they are economical in initial cost, Wissco-Loy Screens offer maximum accuracy because *they are tailor-made to your specific need.* Long-lived? You bet! Wissco-Loy Screens are made from a tough special wire, and every knuckle is carefully crimped to prevent "hidden wear" at the wire intersections.

What's more, Wickwire engineers are always available to help you solve your screening problems and then to recommend the right screen for your job. Get the whole story right now without obligation. Just contact your nearby CF&I representative or write direct to the nearest sales office listed below.

Need stainless steel space cloth or extra-rugged screens? Your CF&I representative is the man to see for these, too. He can supply a complete line of stainless steel, as well as extra-tough, oil-tempered Super-Tempered Precision Space Screens. Get the whole story from him today!



CF&I SPACE SCREENS
THE COLORADO FUEL AND IRON CORPORATION

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THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver
El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland
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WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
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If you're not in the book *you're a man without*



. . . . . a country
. . . . . a state
. . . . . a county
. . . . . a town
. . . . . a party
. . . . . a street
. . . . . a school
. . . . . a *vote*

Look at all the things you can lose, if you're not a registered voter.

If you're not in the book, you lock yourself out of the elections. The polls are closed to you. You can't vote on streets, or schools, councilman or mayor (not to mention congressman, senator or president). You don't even have the right to *complain* about your government and the way things are run!

But more than that, you cut yourself apart from your neighbor next door, your friends at the shop, your fellow members in union or club.

You lose the right to look that boy of yours in the eye when he wants to know if you're doing your part.

And you lose the self-respect that comes from knowing you can walk into the polls on Election Day—the one place in the world where all free men are really equal. Isn't it too much to risk for the little time that registering takes?

Get your name in the book
—and do it now!

Is your name in the book?

DOW



JIM: "Not interested . . . been using the same flocculant for 19 years!"



PHIL: "I'm always looking for something better, let's give it a try!"*

Which is your reaction to the revolutionary flocculant, SEPARAN 2610?

Oftentimes the solution to a problem is right at hand . . . if we are willing to accept change.

Jim, for instance, was having trouble with stream pollution and high maintenance costs. His coal washer was overloading the thickener. Overflow solids were too high for efficient washing. "I don't care how good Separan 2610® is," he said, when told about this new high-speed Dow flocculant. "I've been using the same flocculant for 19 years and don't intend to change."

Phil, on the other hand, had the same settling and filtration problems as Jim, but waving tradition aside replied, "Let's give Separan 2610 a try!" With only 0.06 pound per ton of fines, Phil cut clarification time from two *hours* to seven *minutes!* Water was conserved! Recycling, clay staining and stream pollution were reduced drastically!

*A sample of Separan 2610 and technical assistance is available by writing THE DOW CHEMICAL COMPANY, Dept. SC 931E, Midland, Michigan.

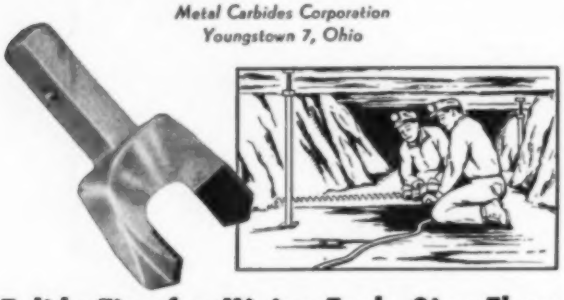
you can depend on DOW CHEMICALS DOW

SUPERSET CORE BITS



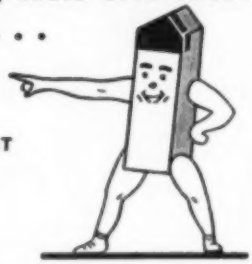
● Mining contractors, ore prospectors, coal operators and construction firms are realizing tremendous savings by taking advantage of our **exclusive fabrication service!** Contractors send us the necessary diamond stones from their own stocks—we hand set them in a super-hard tungsten carbide crown and braze to the threaded steel blank. Hand-set bits assure the proper positioning of each diamond stone to achieve maximum cutting efficiency. The carbide matrix holds the diamond stones until entirely used up. These advantages mean lower drilling costs to you. We can also supply complete core bits or salvage the stones from used bits at nominal cost. Supplied in standard sizes EX, EXE, AX, BX, NX, etc.

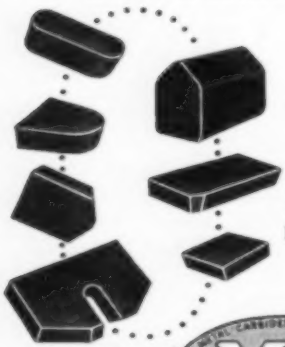
Metal Carbides Corporation
Youngstown 7, Ohio



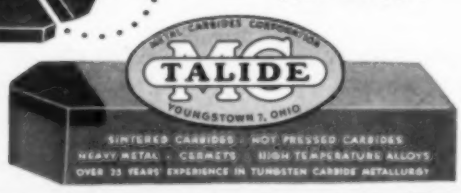
Talide Tips for Mining Tools Give These 3 BIG ADVANTAGES . . .

1. EXTRA STRONG
2. SUPER HARD
3. SHOCK RESISTANT



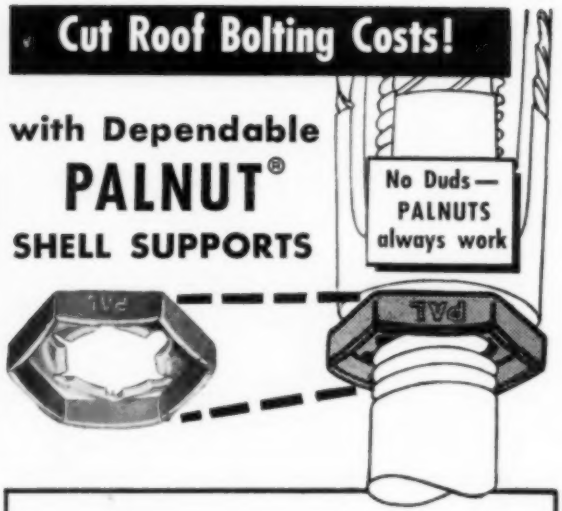


● A complete line of low-cost, high-quality Talide Tips is offered fabricators and users for tipping machine bits, rock bits, drill bits, roof bits and open-pit bits. All Talide Tips have a special surface finish that facilitates brazing. Non-standard shapes and sizes quoted on request.



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with Dependable
PALNUT®
SHELL SUPPORTS



PALNUTS hold in softer types of strata where other shell supporting methods are often inadequate. Cuts costs by eliminating re-installation of bolts caused by shell support failure.

PALNUTS cost less than ½ as much as forged ears. Are easy and fast to assemble—offer worthwhile savings over other shell supports when plain bolt, PALNUT and standard type shell are assembled underground.

PALNUTS are also widely used on reclaimed bolts.

You can buy roof bolts with PALNUTS pre-assembled or buy PALNUTS separately from your jobber.

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Subsidiary of United-Carr Fastener Corporation

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Skilled crews and complete stock of core drills and accessory equipment maintained at all times

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Parmanco

Model 51-55 Dual

COAL DRILL



TWO DRILLS IN ONE

"It's a life saver to us"
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Working ahead of an 8-yard loading shovel in 4-ft. coal, speed is essential.

Traction, hydraulic and electrical system operated by 109 hp engine. Push button controls. Drills can be operated singly or in tandem.

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—completely automatic

Blast holes, as seen in the picture, are kept clean from cuttings dropping back down the hole. A dam is formed about each blast hole excluding casual surface water.

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Please send complete resume, including references. Information will be kept strictly confidential.

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Submit complete resume, references and compensation desired.

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five carloads
13800 volt transformers
sizes 25 KVA to 250 KVA
new and slightly used

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Reliable rewind and repair service on all makes of transformers

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40 Years' Dependable Service

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Operating Management of a group of mechanized coal mines in Central Pennsylvania. Salary to attract top capability. Replies confidential. Write to P-2059, Coal Age.

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Box 416 Phone 3581 Beckley, W.Va.

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TUNGSTEN CARBIDE SCRAP

ROCK BITS, DRILL BITS

Advise Quantity. Highest Prices Paid.

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WANTED

¾ YD. LIMA SHOVEL

Must be late model in excellent condition

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

ROOF-BOLTING OUTFIT

Complete with Acme Track-Mounted
160 cu. ft. Compressor
SJ173-32RX Stopper Arm Complete
DK280-50X Dust Collector
S11DCS Single Offset Dust Collector Stoper
(The above is all new equipment)

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PROUD OF BEING "YES-MEN"

Whenever anyone asks us if we want to buy complete mines, loaders, cutters, shuttle cars, substations, copper wire, or any other type of surplus equipment, we always say *YES*. That goes for *ONE* or a *MILLION* items, Truck load, Car load, or Train load. Fair prices always, regardless of seasonal fluctuations.

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BUY FROM THE LARGEST STOCK OF GOOD MINING EQUIPMENT IN AMERICA. INCLUDES ALL TYPES OF JOY CUTTERS, LOADERS, SHUTTLE CARS, CAT TRUCKS, BELT CONVEYORS, CHAIN CONVEYORS, ETC.

JOY EQUIPMENT — rebuilt

6—Joy 20BU Loaders, latest type.
3—Joy 14BU, low pedestal loaders, 3B-J Head Motors.
2—Joy 12BU Loaders, 7E, excellent.
1—Joy 14BU, 7BE Loader, 10 H.P. head motors.
6—Joy 8BU Loaders.
3—Joy 11BU Loaders.
12—Joy 8SC Shuttle Cars, lowest type.
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars.
6—Joy 32E15 Shuttle Cars.
2—Joy 42E16 Shuttle Cars.
3—Joy 42E13 Shuttle Cars.
1—Joy T-1 Standard Cat Truck.
1—Joy T-2-5 Cat Truck, AC.
5—Joy T-2-5 Cat Trucks, 250 volt DC.
1—Joy T-2-6 Cat Truck with reel.
2—Joy Ladel MTB 30", 25 and 40 H.P., tandem drive, 2000' Belt Conveyors.
4—Joy 11B Cutting Machines, like new.
1—Joy 7B Cutting Machine, excellent.
5—Goodman 660 Loaders on cats, Excellent.
8—Goodman Machines on cats, 51" high. All hydraulic.
3—Goodman 512 Cutting Machines with Bugdusters" like new.
3—Jeffrey 29UC Cutting Machines, cat mounted, perfect.

LOCOMOTIVES

2—Jeffrey 20 ton, type MH-110, 42" and 44" Ga.
4—Jeffrey 13 ton, MH-110, 36", 42" and 44" Ga.
3—Jeffrey 10 ton, type MH-78, 42" and 48" Ga.
4—Jeffrey 8 ton, type MH-100, 42", 44" and 48" Ga.
12—Jeffrey 6 ton, type MH-88, 42", 44" and 48" Ga.
3—Jeffrey 4 ton, type MH-96, 42", 44" and 48" Ga.
3—G. E. 4 ton, type 825 Locomotives, 26" high.
10—G. E. 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G. E. 8 ton, type 822 Locomotive, 44" Ga.
3—G. E. 10 ton, type 809 Locomotives, 42", 44" and 48" Ga.
1—G. E. 10 ton, 829 Locomotive, 36" Ga.
1—Goodman 4 ton, S-30 Locomotive, 22" above rail.
8—Goodman type 33, 6 ton, 44" and 48" Ga.
2—Goodman 8 ton, type 32A, 44" and 48" Ga.
1—Westinghouse type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse type 906, 44" and 48" Ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.
3—Gasoline and Diesel Locomotives, 4 to 10 tons.

TIPPLE EQUIPMENT

1—Cedar Rapids portable super Screening Plant.
1—Portable Belt Conveyor 20', gas driven.
1—Railroad Car Unloading Conveyor, gas driven.
1—Allis Chalmers 5' x 14' Ripoflo Vibrator.
1—4' x 10' Robbins Gyrex Vibrator.
1—4' x 14' Vibrator, three deck, low head.
Feeders, Drag Conveyors, and Loading Booms.

CUTTING MACHINES

3—Jeffrey 29UC Universal on cats.
4—Baby Goodman 212's, rebuilt.
3—Goodman 312's, 18" high.
3—Goodman 412's, 18" high.
3—Goodman 512's with Bugdusters, like new.
15—Goodman 12AA's and 112AA's.
10—Goodman 324 Slabbers.
2—Goodman 224 Slabbers.
2—Goodman 724 Slabbers.
30—Jeffrey 35L's, like new, 17" high.
15—Jeffrey 35B's, and 35BB's.
2—Jeffrey 29B's on track.
1—Jeffrey 29L, track mounted.
2—Jeffrey 29C's, track mounted.
1—Jeffrey 29U, Universal, track mounted.
1—Sullivan CR-10, 15" high.

LOADING MACHINES

7—Joy Loaders, all types.
2—Jeffrey 61 CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Goodman 360 Loaders.
4—Myers Whaley No. 3 Automat Loaders
4—Clarkson Loaders, 26" above rail.

CONVEYORS

4—Joy 30" Belt Conveyors, 10 to 40 H. P.
2—Goodman 97-C's, 26".
15000' 30" Conveyor Belt.
8—Jeffrey 61AM Room Conveyors, 300 ft.
10—Jeffrey 61HG Face Conveyors.
5—Room Conveyors, type 400, 300 ft.
2—61EW Elevating Conveyors.
2—61WH, 15" Room Conveyors, 300 ft.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.

CONVERTERS and DIESEL PLANTS

3—100KW, G. E. TCC-6's, 275 volt Rotary Converters.
3—150KW, G. E. HCC-6's, 275 volt Rotary Converters.
1—200KW, G. E. HCC-6 Rotary Converter, 275 DC.
3—300KW, G. E. HCC-6 Rotary Converters, 275 DC.
1—200KW Westinghouse Rotary Converter, 275 DC.
1—300KW Westinghouse Rotary Converter, 275 DC.
1—500KW Westinghouse Rotary Converter, 275 DC.
(All the above with 6900/13000 and-or 2300/400 primary transformers.)
2—150KW MG Sets, G. E. and Westinghouse.
2—200KW MG Sets, Westinghouse.
1—200KW MG Sets, General Electric.
2—300KW MG Sets, General Electric.
2—500KW MG Sets, General Electric.
1—Cummins 125KW, 250 volt DC.
1—700 H.P. Shaft Heist, complete.
Complete steam plant, will sell all or any part.
Boilers, like new, 1100 H. P., 500 H. P. Transformers, Turbines, etc.
Complete Tipples with Cleaning Plants.

MISCELLANEOUS

10—Air Compressors, 1 H. P. to 40 H. P.
40 Mine Pumps, all types.
Pipe, Plastic, steel transit, all sizes 1" to 6".
35—Mine Cars, drop bottom, 42" Ga.
150 Mine Cars, 18" high, end dump, 44" Ga.
300 Mine Cars, end dump, 20" high, 48" gauge.
15—Brown Gayro HKL and HGD Car Spotters.
1—12 ton Differentia Slate Larry.
4—Overhead Bridge Cranes.
1—Kanawha Hillside Dump.
5—Low Vein Water Cars.
Inclined Hoists, 25 to 50 H. P.
Machine Tools for Mine Shops.
1,000 Tons Rails, all sizes.
2,000 ft. 3 c. 5000 volt, 2 c Cab'e.
10 tons copper Trolley and Feeder.
300 Transformers from 1 to 2,000 KVA, 110 to 13,000 Primary Volts.
400 Electric Motors, 3 to 200 H. P.
Suspension Bridge, 300' long for river crossings.
1—International TD-24 Angledozer.
1—International TD-18 Angledozer.
Huge stock of mine supplies.

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Also, Standard 6 yd. Shovel Front Attachment for 2400 Lima and 5½ Standard Shovel Front Attachment for 4500 Manitowoc

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313 Hazleton Nat'l. Bank Bldg.

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1½ to 10 Tons 18" to 56½" Track Gauge.
GREENBURG MACHINE CO.
Greenburg, Pa.

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3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12" x 15"
1—Card portable loader, 11" x 19"

ROTARY DUMPER

1—Card Rotary car dumper, 13' x 15' platform

ELECTRIC HOISTS

1—11 HP Vulcan, single drum
1—20 HP Vulcan, single drum
1—22 HP Vulcan, double drum
1—25 HP Vulcan, single drum
1—30 HP Vulcan, single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
1—75 HP Vulcan Double Drum
4—100 HP Box single drum
1—112 HP Vulcan, single drum
1—150 HP Vulcan, single drum
2—125-200 HP Ottumwa single drum
1—230 HP Ottumwa single drum

RAIL

12—90# Rail, new and used, in stock, with fittings

LOADERS & CONVEYORS

3—5 BU Joy loaders, 250 V. D.C.
1—61EW Jeffrey elevating chain conveyor
1—61HG Jeffrey chain conveyor, 90°
1—61W Jeffrey chain conveyor, 200'
8—G-20 Goodman shakers
6—G-15 Goodman shakers
8—Vulcan shakers
1—UN-17 Joy LaDel shaker
10—Goodman HA duckbills

MINING MACHINES

A.C.

1—7B Sullivan super shortwall
16—Sullivan CE7
1—28A Jeffrey
5—112A Goodman

D.C.

3—7B Sullivan super shortwall
2—T-1 Joy crawler type trucks

SCALES

3—100 ton Fairbanks railroad scales
1—125 ton Howe railroad scales

COAL CARS

80—60 cu. ft. Card steel, end dump, 36" ga.
88—66 cu. ft. Card steel, end dump, 36" ga.

SHUTTLE CARS

1—Joy model 42D5, battery operated
1—Joy model 60D3P, battery operated
7—Joy model 60D1, battery operated

MINE FANS

1—120" Joy La-Del axial flow fan, model L-14
1—8H Jeffrey 42" aerodyne fan
1—7' Jeffrey aerodyne 2 stage fan

BATTERY LOCOMOTIVES

1—4 ton Westinghouse, 24" ga.
1—4 ton Ironton, 36" ga.
2—5 ton General Electric, 36" ga.
2—7 ton General Electric, 36" ga.
3—8 ton Ironton, 36" ga.
2—8 ton General Electric, 36" ga.
2—8 ton Goodman, 36" ga.
1—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES

1—2½ T. Jeffrey, 36" ga.
1—4½ T. Goodman, 36" ga.
1—5 T. Jeffrey, 36" ga.
1—6 T. Goodman, 36" ga.
1—6 T. Goodman, 42" ga.
2—8 T. Goodman, 42" ga.
3—10 T. Jeffrey, 42" ga.
1—13 T. Goodman, 42" ga.
1—13 T. Jeffrey, 42" ga.
3—15 T. Jeffrey, 42" ga.

MOTOR GENERATOR SETS

1—7 k.w. General Electric 125 V. DC — 440 V. AC
1—40 k.w. Imperial 250 V. DC — 440 V. AC
1—75 k.w. Lidgeway 125 V. DC — 2300 V. AC

COAL CRUSHERS

1—18" x 18" Jeffrey Single Roll
1—30" x 30" Jeffrey Single Roll

ROCK DUSTERS

1—M.S.A. type A, 2 HP 250 V. DC motor
1—M.S.A. type A, 440 V. AC motor
1—M.S.A. #S-1103, 20 HP 230 V. DC motor

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Since 1898 Dependable Reconditioned Machinery

Send for new reconditioned stock list catalogue 561-C.

MORSE BROS. MACHINERY CO.

2900 BRIGHTON BLVD. EST. 1898 DENVER 1, COLO.

CONVEYORS

1—30" Belt conveyor 150 ft. long, complete with Dings Magnetic head pulley, 15 HP 220 volt AC motor and speed reducer. New type Jeffrey ball bearing idlers.
1—24" Wide Belt Conveyor approximately 60' long.
1—McNally Pittsburg Bucket Elevator 27½' center, 31½' overall height. Buckets 11¾" x 10" x 10½".

COPPER CABLE

Approx. 7500 ft. 3/con. 2/0, 5000 volt trenchlay cable as good as new, wrapped on reels, 300-500 ft. long.
Several 1000 ft. reels of 3/con., 2/0 armored lead covered 2300 volt cable.
700 ft. New 300,000CM lead covered, armored single conductor cable.

CRUSHERS

1—18 x 18 McNally Pittsburg double roll stocker crusher.
1—20 x 24 McNally Pittsburg single roll.
1—24 x 48 McNally Pittsburg double roll crusher, newest type, only used approx. 30 days, good as new with steel base and V belt drive.
1—24" x 36" McNally Pittsburg Double Roll Crusher.
1—24" x 42" McNally Pittsburg Single roll crusher, like new.
2—30 x 36 McNally Pittsburg Single Roll crushers.

DRILLS

1—Dooley Bros. 580 Drill, model A10, 250 V DC, complete with Dooley 5600 drill arm mounted on rubber tired carriage. Self propelled with another 580 Dooley drill. Tires are 4.00-8. Overall height of drill from floor 36".

FANS

1—4' Jeffrey booster fan, ball bearing.
1—7' Joy Fan, type H-111-36, like brand new.
1—5' Jeffrey 8H-60 Aerodyne Fan complete with 175 HP Westinghouse 2300 volt ball bearing motor and magnetic controller.

LOADING MACHINES

1—8BU Joy Loader, 220 volts AC permissible, like brand new.
3—8BU Joy Loaders, 250 volts, DC, all ready to go to work.
1—12E Elmco Rocker Shovel 3 phase, 60 cycle, 220 volt. Purchased new a short time ago and used only a few weeks.

LOCOMOTIVES

1—15 Ton MH77 Jeffrey ball bearing armature locomotive, 42" gauge. Dimensions—length 16' 8", width 5' 4½", wheelbase 6' 4", height 42".
2—8 ton Jeffrey, ball bearing journals and motors, 48" gauge, type MH78.
25—6 ton MH88 Jeffrey, ball bearing, 42" gauge.
1—8 ton Goodman type 91K42-54T, 42" gauge, 27" high, new in 1950, used only 6 months.
12—6 ton Mancha Battery locomotives, 42" gauge, 42" high overall. Sold with or without batteries.
All Electric Locomotives 250 volts, DC.

MINING MACHINES

6—7B-1 Sullivan, 250 volts, DC, 8½' cutter bars, complete with bugdusters, permissible with Joy T1 Cat trucks.
1—512 EJH Goodman 250 volt, DC, 8½' cutter bar complete with bugduster. With or without Joy T1 truck.
1—512 EJ Goodman 250 volt, DC, 8½' cutter bar with or without Joy T1 truck.

GENERATOR SETS

1—200 KW Ridgeway, 2300 volts, AC, 250 volts, DC, 900 RPM.
1—300 KW Ridgeway, 2300 volts, AC, end, 275 volts DC end, complete with switchboard as good as new.
2—200 KW General Electric sets, 1200 RPM, 2300 volts AC end, 250/275 volts, DC end, complete with automatic circuit breaker, late type.
2—150 KW General Electric sets, 2300 volts, AC end, 250/275 volts, DC end, 1200 RPM.
5—150 KW Westinghouse sets, 1200 RPM, 2300 volts, AC end, 250/275 volts, DC end.
1—100 KW Westinghouse, 900 RPM, AC end 2200 volts, DC end, 250 volts. Manual Switchboard.
4—200 KW Allis Chalmers, 275 volt DC, 2300 volt AC, complete with fully automatic Clark control panels. Sets new in 1948, and used less than one year. Like brand new.
1—300 KW Allis Chalmers Rotary Converters, volts 185, amps 600, 6 phase, 60 cycle, 1200 RPM, DC, volts 250, amps 1200, complete with manual starting equipment and transformers as good as new, tested by a large electrical shop.
1—200 KW General Electric synchronous Rotary Converter #4098227, type HCC-6-200-1200, 1200 RPM, 60 cycle, 275 volts, 727 amps, Steel base complete with transformers, in perfect condition. As good as new.

SHUTTLE CARS

2—42E-18 Joy, elevating discharge, disc brakes, hydraulic steering. Late type, excellent condition.
2—42E-9 Joy, 250 volts, DC, stationary elevated discharge.

TRANSFORMERS

6—500 KVA Westinghouse single phase, 60 cycle, primary 35000, secondary 2300.
3—500 KVA General Electric, single phase, 60 cycle, primary 13200/6600, secondary 2300.
3—250 KVA Standard, single phase, 60 cycle, primary 33000, secondary 6900/11950Y. Late type.
3—100 KVA Westinghouse single phase, 60 cycle, primary 2300, secondary 220-440.

PUMPS

1—Fairbanks Morse centrifugal, 5" suction, 4" discharge, direct connected to 40 HP 220-440 ball bearing motor, rated 450 GPM at 180' head.
1—Fairbanks Morse Bronze centrifugal, 6" suction, 5" discharge, rated 1235 GPM at 180' head, direct connected to 100 HP Westinghouse 440 volt motor.
1—Dayton Dowd centrifugal, 4" suction, 4" discharge, rated 800 GPM at 190' head, direct connected to 50 HP General Electric 220-440 volt motor.

MINE CARS

100—All steel drop bottom, Sanford Day, and ACF, 4 ton capacity, 16" Timken roller bearing wheels. Overall dimensions: length 14', width 6'6", height from rail 38", wheelbase 46", 42" gauge.

VIBRATORS

1—4' x 10' Selectro single deck vibrators, can be made two deck.
1—4' x 12' Deister single deck vibrator.
1—4' x 10' Stephens-Adamson two deck vibrator.
3—5' x 14' Tyler T-600 double deck vibrators.
1—5' x 12' Tyler T-600 double deck vibrator.
2—4' x 8' Tyler T-400 single deck vibrators.
1—5' x 12' Tyler T-600 single deck vibrator.

GAVENDA BROTHERS, Inc., Canton, Ill.

PHONES: 739 and 2438

FOR SALE

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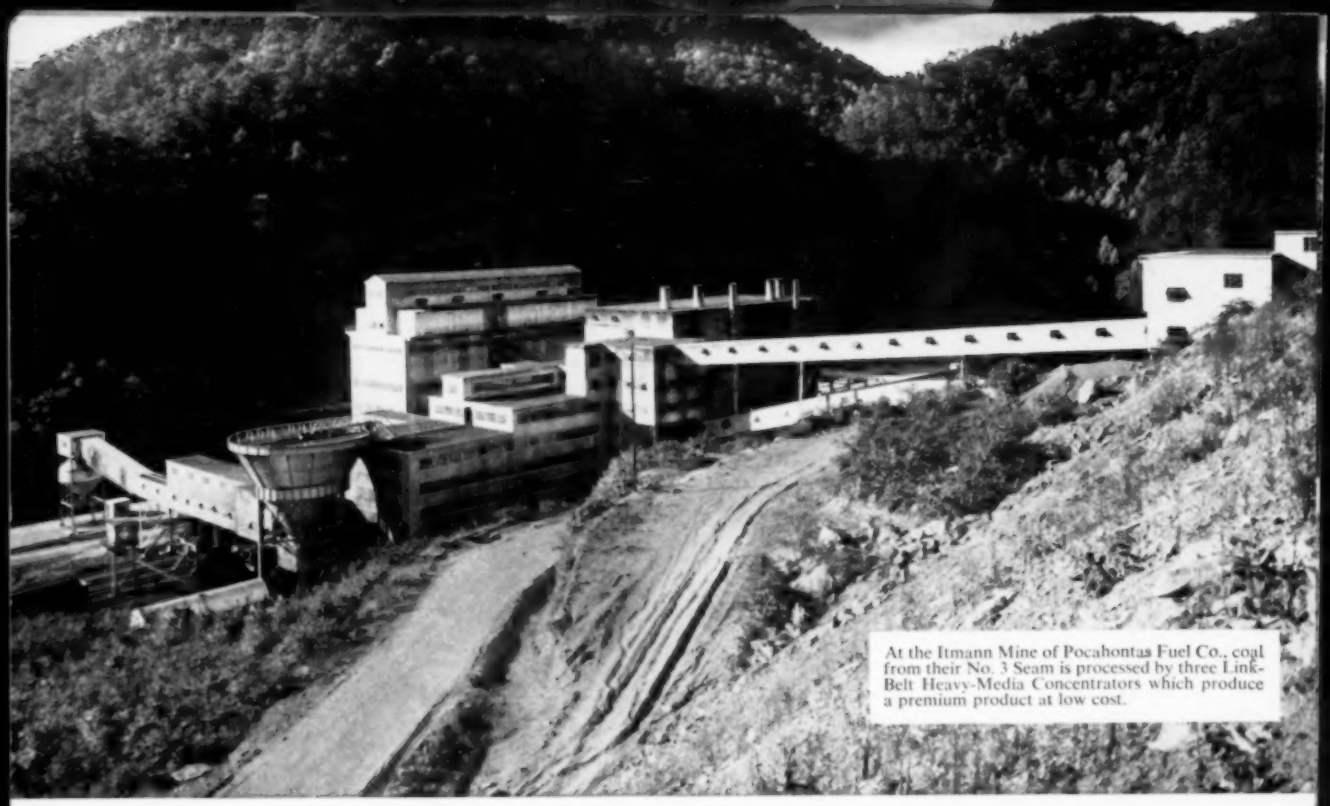
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